



**IRINA LEITE RIBEIRO AS CRIANÇAS CONSEGUEM APRENDER SOBRE
CAETANO DA SILVA ECONOMIA?**



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ECONOMIA?**

Dissertação apresentada à Universidade de Aveiro para cumprimento dos requisitos necessários à obtenção do grau de Mestre em Economia, realizada sob a orientação científica da Doutora Celeste Maria Dias de Amorim Varum, Professora auxiliar do Departamento de Economia, Gestão e Engenharia Industrial da Universidade de Aveiro e da Doutora Vera Mónica Almeida Afreixo, Professora Auxiliar do Departamento de Matemática da Universidade de Aveiro.

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o júri

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palavras-chave

Jovens, instrução económica, nível de literacia económica, variação de conhecimento económico, Questionário de Literacia Económica.

resumo

Esta tese aborda duas questões de investigação fundamentais: 1) quão eficazes são os programas económicos quando aplicados às crianças e, consequentemente, qual a capacidade e a aptidão desta população em específico para compreender e apreender conceitos económicos; 2) que fatores, além da instrução económica, afetam o resultado obtido pelas crianças nos testes de economia.

Neste sentido, foi desenvolvido um questionário sobre literacia económica tendo-se, igualmente, procedido à comparação do nível de literacia económica e da variação em termos de conhecimento económico, contrastando um grupo de controlo que foi sujeito a formação económica, e um outro grupo de crianças que não foi sujeito a esta acção. O programa foi aplicado a crianças que frequentam os 3º e 4º anos de escolaridade. Com vista à recolha de dados, foi aplicado um Questionário de Literacia Económica antes e após a conclusão do curso.

A análise empírica aqui reportada foi subdividida em dois estudos. O Estudo 1 baseia-se numa amostra de estudantes que responderam ao questionário após a implementação do programa. O Estudo 2 tem como suporte uma amostra de estudantes que responderam aos dois testes, antes e após a implementação. As estatísticas descritivas e uma aplicação econométrica fundamentam a análise empírica de cada um dos estudos.

Os resultados obtidos no primeiro e no segundo estudos confirmam a eficiência do programa económico aplicado a este grupo de estudantes. De acordo com os resultados, é ainda possível inferir que, as variáveis demográficas e socioeconómicas, bem como as atitudes dos alunos face à economia, são factores que contribuem para a sustentação das disparidades existentes, entre as crianças, em termos de conhecimento económico.

Este estudo contribui, assim, para o enriquecimento da literatura, na medida em que confirma o interesse e a capacidade das crianças para compreender e aprender economia. Desta forma, programas económicos direccionados para esta população e para um nível educacional elementar mostram ser eficazes na disseminação do conhecimento económico.

Este trabalho é, ainda, parte integrante de um projeto pioneiro em Portugal, na medida em que pretende estimular o interesse das crianças por esta ciência social e contrariar o baixo nível de literacia económica da população portuguesa.

keywords

Children; economics instruction; level of economic literacy, variation of economic knowledge, Questionnaire of Economic Literacy.

abstract

This thesis addresses two fundamental research issues: 1) the efficiency of economic programs applied to children, and doing so, if children are able to learn and to understand economics; 2) which factors, apart from economic instruction, affect children's test scores in economics.

In this regard, a questionnaire on economic literacy was developed and both level of economic literacy and variation of economic knowledge were compared, contrasting a control group who received economic instruction and other group who did not. The exercise was applied to a sample of children attending 3rd and 4th grades. The questionnaire, through which data was collected, was applied prior and after children had gone through the economic program.

The empirical analysis here reported is divided into two studies. Study 1 is based upon a sample of students who responded only to the post-implementation questionnaire. The Study 2 relies upon students who replied to both pre and post-implementation tests. Each study relies upon descriptive statistics and an econometric application.

The results obtained in both first and the second studies confirm the efficiency of the economic program applied to the students. According to the results, demographic and socioeconomic variables, as well students' attitudes towards economics are the factors which explain the disparities of economic knowledge among children.

This study also contributes to an ongoing discussion in the literature, ascertaining children's interest and capacity to understand economics. Hence, economic programs which are targeted to this specific population and at this early age can indeed be effective.

This work relies on a pioneer project in Portugal, being important not only because it encourages children's interest towards economics, but also because it intends to contradict the lack of economic literacy of the general population in Portugal.

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1 Introduction

It seems consensual that the recent crisis has reinforced the importance of being economically literate and the need of having a solid understanding of the functioning of the economic activity (Haskell and Jenkins 2002; Stern 2002).

Economic literacy can be viewed as the type of knowledge required to control a set of tasks related to economic issues and that everyone who is economically literate might know (Kotte and Witt 1995). It provides people with the essential tools and knowledge to understand economic and financial issues and to predict more accurately the events that might affect their present and future welfare. It becomes clear though that to improve economic literacy, economic education the right path to shift in. The knowledge generated within economic education allows consumers to develop the required skills to meet their personal and financial goals.

It has been argued that the best way to promote a society of financially and economically literate adults is to educate children (Santomero 2003). There are however doubts about children interest and capacity to understand economic principles (Berti and Bombi 1981; Webley 2005). Economics is often understood as the ugly side of social sciences.

Against this background, a few authors argue that children are indeed able to understand economics, providing evidences about the efficacy of educational programs on economics to children (Kourilsky 1977; Laney 1988; Hawthorne, Rodgers et al. 2003). Along with Hawthorne, Rodgers et al. (2003) for example, several authors defend that early instruction in economic principles on the primary grade-level – kindergarten through third or fourth grades, adapted to students' needs might provide children with a solid understanding of economics, by exposing them to economic conceptions and moreover by providing them the skills to apply the knowledge acquired in the economic lessons.

This thesis contributes to improve knowledge on this field of research, providing evidence on the interest of children about economics and on the efficacy of a program of economic education to this target group. The thesis has been developed within a pioneer project, "Economicando", carried out at Aveiro's University.

This project's main goal consisted of developing activities to administer basic economic concepts to children aged 7-13, and to measure the impact of the program on children flow of economic knowledge.

The development of the activities and the formal economic instruction was carried out by Professors and researchers from Aveiro's University, with previous economic formation and in-service experience. It is though possible to identify this study's objectives, which consist of testing the efficacy of targeting economic programs at schools and to identify the factors contributing to explain children's differences in terms of stock and flow of economic knowledge.

The current work is organized as it follows. Chapter 2 presents a literature review on the concept of economic literacy and how economic education is the key engine to increase the population level of economic literacy. Additionally, a review on the factors contributing to a higher or lower score on economic assignments is presented. Chapter 3 presents the methodology applied. Chapter 4 discusses the results obtained. Chapter 5 concludes this study.

2 Economic Literacy – What Is It And Why Is It Important!

2.1 Summary

Thinking of the lack of economic literacy in Portugal, this chapter main goal consists of justifying the importance of being economically literate in a context of crisis. In this regard, in the first section- Economic Literacy – “What is it and Why is it important!”, it is presented a literature review on the definition of the concept of economic literacy, as well on the importance of being economically literate. Furthermore, it is highlighted the importance of educating children, once educating children is to promote a society of financially and economically literate adults (Santomero 2003). Section 2.4. discusses in detail the factors which, accordingly to the literature, are likely to affect children’s test score in economics. This literature review provides the *rationale* for the econometric models applied in Chapter 4.

2.2 The concept

The value of economic literacy began to be recognized early back in the 1920s and 1930s. The leaders of economics and business have shown their interest in promoting a better economic understanding by establishing the Committee for Economic Development (CED) in 1942 (Duvall 2000).

Economic literacy can be viewed as the type of knowledge required to control a set of tasks related to economic issues and that everyone who is economically literate might know (Kotte and Witt 1995). Common daily operations as paying a bill, comprehending a balance sheet are related to the concept of economic literacy. Rivlin (1999) defines economic literacy “as a rudimentary working knowledge of the concepts and language of economic activity and economic policy, rather than the language of economics” (cited in (Koshal, Gupta et al. 2008)).

The importance of being economically literate and a solid knowledge of the economic activity have been reinforced by the actual crisis. Being economically literate means having information about economic issues such as high trade deficit, inflation, developing the ability to evaluate the costs and benefits of the available hypotheses or form opinion about the public support to trade barriers. A literate citizen in economics may undertake

politicians' accountabilities and playing an active role in the society, thereby assuring an efficient democratic system.

In this regard, Gupta (2006) enumerates several motives why the need to acquire greater economic literacy is increasing, more specifically the following ones: individuals are even more expected to assume their responsibilities and to take their own risks (1); the rapid diffusion of information, i.e. the quantity of information available is overloaded, and citizens belonging to a democratic nation must be economically literate in order to participate actively in society and to hold political accountabilities, as mentioned above (2); the experts in economics difficult the understanding of economic issues to the ordinary citizen (3), and finally, the existing interrelations of markets and financial institutions are increasingly more complex (4). This set of transactions and interactions of markets and financial systems which constitute the economic activity will bring direct or indirect consequences to citizens. In this sense, being aware of basic economic concepts and developing an economic way of thinking will certainly contribute to individuals' well-being, as they will become better investors, consumers, savers and workers (Mathews 1999).

Assuming that "economic literacy is the goal, economic education is the process or the delivery system through which economic literacy is achieved" (Jenkins and Nelson 2000).

2.3 The Importance of Economic Education

Why economic education is important? Stern (2002) answer to this question by ascertains that the invisible hand works better when individuals are economically and financially literate, whether they are investors, business people or policymakers. Thinking of the existing scarcity, well-informed citizens make better decisions regarding an efficient allocation of resources. Clever decisions contribute to higher levels of efficiency, productivity and to a better economic performance. Haskell and Jenkins (2002) also highlighted the need of having well-informed consumers, knowledgeable decision makers, efficient workers and prudent savers and investors so that the economy performs better and the level of uncertainty is constrained.

Economic education provides people with the essential tools and knowledge to understand economic and financial issues and to predict the events that might affect their financial outcome. Additionally, the knowledge generated within economic education allows consumers to develop the required skills to meet their personal and financial goals. Financially and economically literate consumers are better able to contribute to stable and prosperous communities, as well to foster economic development (Santomero 2003; Hogarth 2006).

The importance of economic education or economic literacy may also be analyzed from three different perspectives: in terms of the asset side, the debt side or the macro side. Firstly, due to the huge variety of financial products and the increasing innovations on the financial market, the asset side has become even more complex. To be economically knowledgeable is the only possible way to choose wisely among all the existing alternatives, whether it refers to invest in equities and bonds or to different contracts 'options linked to a certain level of risk.

Secondly, thinking of the debt side, there is a huge range of loan possibilities and several credit instruments available to consumers. Being financially literate will provide customers with the right skills to choose the one option that meets their needs. A poor level of economic literacy is critical, as households' debt plays a relevant role in the banks' balance sheets, which level of debt, is affected by their own choices. Being economic illiterate may aggravate a nation's economic situation, especially during a recession period.

Finally, on the macro side, economic literacy is important because it contributes to a better performance of markets and policies. Well-informed and financial literate citizens promote better financial markets, where rogue products are expelled from the market. Additionally, they are also able to make better economic policies. Higher levels of economic literacy are also related to higher levels of wealth and income, which will reestablish the confidence on the economic system (Jappelli 2010).

It becomes clear though that to improve economic literacy, this is the right path to shift in. Moreover and thinking of the lack of economic and financial literacy, to promote a society of financially and economically literate adults, is to educate children (Santomero 2003).

2.3.1 Economic literacy and children

Children are exposed to economic concepts daily, as they assist to their parents' economic transactions and the activity of exchanging money for goods becomes increasingly familiar. Moreover, children receive money as a gift, sometimes saving it in a bank account or spending it in paying for some purchases.

However, not only the daily journey contributes to the economic development of the child, every source of information, especially the media, plays an important role on the child's economic awareness. Facing so many options and due to the variety of products advertised, children are obligated to choose among from two or more different options which requires an economic way of thinking (VanFossen, 2003).

While playing with their peers, by pretending to pay for a good or for a service, children are already able to understand economics on early childhood, arriving at kindergarten ready to learn it (Rodgers, Hawthorne et al. 2004).

However and following the Piagetian theory, children's economic understanding evolves through different stages. From 3-7, which corresponds to Piaget's preoperational stage, children are able to understand observable occurrences, without reasoning the connection between them; on the concrete operational stage (7 -12), children's economic knowledge becomes more cohesive, as they are able to understand economic transactions at this age and finally, the formal operational stage or the adolescence period is characterized by the recognition of economic acts as a whole, i.e. those are a combined part of an unique and comprehensive system, in which the connections are conceived by common purposes (Thompson and Siegler 2000).

Considering children's economic literacy, it is crucial to make reference to the work of Strauss. Strauss (1952) considered children's understanding of the concepts of money and profit. To conduct his study, he interviewed 66 American children aged 4 to 11 and found

nine different stages of child economic way of thinking. At the sub-stage (3 – 4:6 years¹), children are able to recognize the concept of money, but they cannot distinguish between the different kinds of coins and, at this stage, they only have a vague awareness that money is somehow related with the action of buying and selling. Despite children remain without understanding the difference between the several types of coins, at stage 1 (median 5.4) the notion that money has something to do with buying becomes more clear. This stage is mainly related to the existing transactions between shopkeeper and customers, additionally children are not aware that shopkeeper can assume the role of customer and they tend to believe that shopkeeper obtain goods for sale from other stores, without paying for it. At stage 2 (median 6.5), children understand the value of money and it becomes a symbolic equivalent to the actual merchandise. Compared to the previous stage, at this stage, children's understanding evolves in what concerns the supply of goods, now they believe that shopkeepers obtain goods from a manufacturer to whom they pay a monetary value. At stage 3 (median 6.3), they realize that money is not always enough. At stage 4 (median 6.5), children realize that shopkeepers need money because they also need to pay their employees. At stage 5 (median 7.10), children understand that producers need money not only to pay their workers, but also to buy raw materials. At stage 6 (median 8.7), the child is confronted with the idea of credit. At stage 7 (median 8.9), children are aware that the shopkeeper can delegate functions to his employees and he can control the shop without being physically present. At stage 8 (median 9.9), there is a much clear understanding of the concept of profit. Finally, at stage 9 (median 11.2), the child recognizes the possibility of existing conflicts related to individual interests.

The article of Berti and Bombi (1981) built on Strauss and Shuessler's work was also conducted within a Piagetian framework. In order to comprehend children's notions of the value of money and its utility during the act of buying and selling, the authors interviewed a total of 80 children aged 3 to 8 years. Children were obligated to choose among from toys, sweets, comics, while coins and bank notes were introduced into the interview, so they could recognize money and its utility. While children were playing the role of customers and storekeepers, it became possible to identify six different levels of child development. At the first stage, the child has a vague knowledge about money. At the

¹ The ages are expressed in years and months.

second stage, despite children's awareness that money is related to the act of buying and selling, they consider all kinds of money alike. At stage 3, children recognize the value of money, by differentiating coins from notes and assuming that the latter has to be used to acquire more expensive items. Stage 4 is characterized by the notion that sometimes money is not enough to buy certain objects, while at stage 5 they establish the exact correspondence between the value of the money and the price of the objects, being able to distinguish money by its physical size. Finally, at stage 6 children are aware of the concept of change, i.e. when a customer pays with a greater sum of money with respect to the object price, the storekeeper has to return that difference to the customer.

As pointed out by Berti, Bombi et al. (1988), at the age of three children have an elementary knowledge of economics. At this stage, children can distinguish between money and other objects and they recognize that money is used for paying for goods or services acquired for instance in shops or stores. They also realize the concept of work, as they are in daily contact with their parents' activity.

From 4 to 5 years, they begin to develop ideas related to economic exchanges, job is seen as a remunerated activity and the notion of ownership does not exist. Despite they are already aware that to acquire goods or services it is necessary to pay, they still cannot identify the reason why people pay for it. The existing tie between work and payment is not clear, as they comprehend that every job has a correspondent salary, but cannot justify the differences in remuneration. At this age, children can reason neither the origin of money, nor the existence of conflicts of interests. The notion about means of production is also really vague, given the fact that children believe that shopkeepers get their goods from other shop, which give them away without asking for money. In other words, children do not understand that shopkeepers can also be a customer. The only two figures recognized by children, at this phase, are the "distributors of goods, services and money" and the customers. Finally, it is also important to notice that children do not have a logical and quantitative reasoning, so it is possible to conclude that children's economic understanding is pre-operational (Berti, Bombi et al. 1988).

Between 6 and 7 years old, children can distinguish between the various types of money, either by the size of the coins or by the number of zeros printed in the banknotes, so they know which monetary unit worth more. Money is now seen as a truly equivalent to the actual merchandise, as the price of object is determined by the characteristics of the good. On the other hand, the function of change is not yet comprehended. For the first time, the concept of profit begins to make sense, thinking of the money as a recompense for work. Even though children attribute the function of producing and selling to the same figure, at these ages their understanding of means of production becomes more accurate. The link between work and money is now understood by children, although they are not able to associate remuneration to employees, as they seem to believe that their salary is paid by the customer who acquires a certain good or service. In terms of paid activities, the range recognized by the child is now much larger compared to the preceding level, however not all type of activities are recognized as work, for instance, the agricultural and industrial activities. They are only able to comprehend the occupations which are susceptible of being observed or experienced directly. Finally, children no longer consider work as going someplace to get money, but begin to make a connection between the activity and its benefits (Berti, Bombi et al. 1988).

Between ages of 7 and 10, it is possible to assist to the development of concrete operatory thinking, which leads to the abandonment of the pre-economic ideas of the earlier levels. Despite children are able to differentiate the shopkeeper from the producer, recognizing some intermediate commercial figures, they do not yet realize that the price of goods is determined by taking into account the costs of production and the cost of labor. The value of money and its function during the act of buying and selling, as well as the concept of change are clearly understood. They also recognize different remunerations, which are settled up according to the quantity of work accomplished. However, they cannot justify the derivation of money paid to the workers by their bosses, as they fail to recognize that salary results from the sale of the goods or services produced by their work. So, it becomes clear to them the existence of hierarchy in the work relationships. They do not understand that the materials necessary for production are not old or broken things and they fail to recognize that raw materials are natural products. There is some clarity concerning their ideas about the bank.

The formal operatory period arises after the age of 10. Contrary to the preceding level, at this stage children understand that workers pay their employees with the money received from the sale of the goods and services produced by them. The costs of production, the labor, the intermediaries and the profit margin are taking in account when the price of goods is determined. The owner and the boss are two distinct figures and a new hierarchy is established, namely worker-boss-owner. Public institutions, government, state and council are concepts more familiar to children at this age. They also realize that “the bank is where to put money and somewhere to get loans from”, so at this moment they are able to establish a precise correspondence between deposits and loan, as the money to pay the loans come from deposits.

Thinking of more contemporary literature, it is possible to highlight the work of Webley (2005), who presents a literature overview on children’s understanding of concepts such as money, prices, demand, supply, profit and banking. Furthermore, as stated by the author, whereas prior studies used to follow a Piagetian approach to explain children’s economic evolvement, current studies tend to consider other explanatory factors conceiving children’s different conceptions of economics, namely, the social surrounding environment, analyzed afterwards.

Table 1 is a synthesis of the child economic development through the three of the stages considered by Piaget, namely, the preoperational stage, the concrete operational stage and the formal operational stage. The stages considered latter are those which allow a clearly understanding of how children’s economic understanding progresses, as the sample selected to the current study includes students aged 8 to 13.

Some studies have found that age or the class year the student is attending are important determinants of student achievement in economics (Gohmann and Spector 1989; Watts and Lynch 1989), cited in (Williams, Waldauer et al. 1992). It is though possible to make a key conclusion about the influence of age on children stock of economic knowledge, i.e. age increases economic knowledge (Walstad and Rebeck 2002).

Table 1 – Child Economic Understanding

| Preoperational Stage Age 3-6/7 | Concrete Operational Stage Age 7-10 | Formal Operational Level + 10 |
|--|--|---|
| <ul style="list-style-type: none"> • Recognizes money • Money is used to pay for goods and services • The notion about means of production is really vague • Distinguishes between coins and banknotes • Money is an equivalent to the actual merchandise • Recognizes the concept of profit • The price of goods is determined by its characteristics • Attributes the function of selling and producing to the same figure | <ul style="list-style-type: none"> • Knows people work to make money • Fails to recognize that raw materials are natural resources • Different remunerations are determined by the amount of work. • Differentiates the producer from the shopkeeper and additionally they recognize the existence of commercial intermediates • Recognizes the existence of an hierarchy in work relationships • Some clarity in understanding the concept of bank • The price of goods is determined by the costs of production, including the labor costs • Understands the concept of change | <ul style="list-style-type: none"> • Knows that workers pay their employees with the money received from the sales of goods or services • Knows the difference between boss and owner • Recognizes concepts as 'government', 'state', 'council' and the understanding of public institutions is more clear • Recognizes a new hierarchy worker – boss-owner • “The bank is where to put money and somewhere to get loans from” • The price of goods is determined by the costs of production, the labor, the intermediaries and the profit margin |

Source: Own Elaboration

Once more, children are the critical audience and economic education programs must be target at schools. These measures will strengthen the relationship between educators, consumers and children (Santomero 2003). Furthermore adults, who have attended economic or financial classes on secondary school, achieve higher levels of wealth in adulthood (Stern 2002). Regarding this, it is expected that economic education programs are positively correlated to children's economics performance; however, it is still important to determine how effective the dissemination of economic knowledge is, whether children are exposure to economic education courses or not.

2.3.2 Testing the effectiveness of economic programs

Kourilsky (1977) have applied three economic education programs to elementary school students – namely – Kinder-Economy program (grades k through 2), the Mini-Society program (grades 3 through 6) and the Co-Learner Parent Education Program. Both programs follow an educational philosophy based on experienced-based instruction. According to the author, these economic programs have shown to be very efficient instructional interventions in the teaching of economics, as it is capable of increasing participants' economic cognition. The author also highlighted that economic instruction is a crucial requisite to achieve economic understanding and reasoning in young children, independently of the economic program selected.

Experience-based instruction also provides children with a higher level of economic reasoning, by helping them to get more accurate conceptions, while correcting for misconceptions. In this regard, Berti, Bombi et al. (1986) and Ajello, Bombi et al. (1987) highlighted the importance of economic instruction on children understanding and acquisition of economic concepts such as profit and work.

In Laney (1988)'s experiment, were given the same two lessons to first grade, third grade and sixth grade students, one lesson on the concept of scarcity and the remaining lesson on opportunity cost. The lecture experiment has proved to be efficient but only for third and sixth graders, as they were capable of learning and retaining both economic concepts. On the other hand, first graders, who initially appeared to have learnt both concepts, did not retain economic knowledge as well as the remaining groups. So as stated by the author, the retention of economic concepts at early primary grades might be quite difficult.

Laney (1999) also introduced the cooperative and mastery learning method, which gives feedback to students, with the main purpose of facilitating the learning process and help them achieving a mastery level. In order to test the effectiveness of corporative and mastery learning programs on the dissemination of basic economic concepts, first grade and second grade students were assigned to one of the four instruction strategies available, namely, cooperative learning, mastery learning, cooperative-mastery learning or a control treatment, in which children did not experienced cooperative or mastery learning methods.

The students also performed a written pretest, a posttest and a delayed posttest thereby it became possible to gauge their understanding of concepts as opportunity cost, scarcity, resource, good, service, among others. Interviews were also an evaluation instrument. The obtained results suggested that students, who were exposed to cooperative-mastery learning method, outperformed students from the control treatment and from the cooperative learning groups, on both posttest and delayed posttest. Cooperative-mastery learning method has proved to be efficient in promoting the acquisition and retention of basic economic concepts.

To conclude, early instruction in economic principles on the primary grade-level – kindergarten through third or fourth grades - adapted to students' needs, might provide children with a solid understanding of economics, by exposing them to economic conceptions and, moreover, by providing them the skills to apply the knowledge acquired in the economic lessons (Hawthorne, Rodgers et al. 2003).

2.4 Factors Affecting Children's Test Score in Economics

2.4.1 Student Individual Characteristics

2.4.1.1. Gender

Studies focusing on economic understanding have found significant gender differences, with male outperforming female. It is, though, important to establish the distinction between stock of economic knowledge and business and the flow of new knowledge, in other words, the level of economic understanding and the learning process of it. In this regard, only one-third of the studies regarding the flow of students' economic knowledge during courses, found higher scores for male students. Thinking of the impact of gender on student's economic knowledge, only two-thirds of the studies have shown statically significant differences between both genders, with men outperforming women (Siegfried 1979).

Moreover, Siegfried (1979) also concluded that the existing achievement differences between sexes appear to occur after early elementary years and prior to college. In terms of flow of economic knowledge, the author found no gender differences in secondary grade level or college.

Buckles and Freeman (1983), by analyzing the students' performance on standardized tests of economics, from 1st grade through 12th grade, found that gender is not a determinant factor to students' economic success, either in terms of stock of economic knowledge or in terms of flow of new economic knowledge. Moreover, when multiple-choice tests are replaced by essays, the male-female difference is minimized (Ferber, Birnbaum et al. 1983), cited in Lumsden and Scott (1987), or inverted (Lumsden and Scott 1987), i.e. it depends on the format of examination. Concerning the level of economic understanding, formal instruction appears to constitute an alternative to narrow male-female differences (Watts 1987).

Controversially and by evaluating the student's stock of knowledge, measured by the student score obtained on the Test of Economic Literacy (TEL), Heath (1989) concluded that male students have higher grades than female students by over 10 points. Furthermore, men are more likely to choose economics as an elective course than women. Meanwhile, according to Williams, Waldauer et al. (1992) findings, female students outperform male students on the numerical and spatial components of the micro exams.

In terms of more recent studies, Ballard and Johnson (2005) were beyond the simple analysis of the gender effect on student performance in economics, instead they decided to study the factors that encourage the gender gap in the study of economics. The authors analyzed how males' expectations differ from females' expectations and, in which measure this contributes to the existing discrepancy in students' achievement. Female students enrolled in an introductory microeconomics course have lower expectations of having a higher grade point average than men, about one-fourth lower.

Additionally, while females' expectations have a negative effect on their performance, males' expectations affect their performance positively. Once more, males have proved to do better than their female counterparts.

2.4.1.2. Personality type

Personality type is an important contributing factor to student success in economics (Ziegert 2000). To prove this assumption, the author replicated the work of Borg and Shapiro (1996), and developed a study considering a group of students enrolled in principles of microeconomics courses. Ziegert (2000) found that differences in personality temperament do affect students' economics achievement, whether the variable was the student course grade or the result obtained on the TUCE exam. In terms of personality types, the authors highlighted the following dichotomies, introversion versus extraversion, sensing versus intuitive, thinking versus feeling and, finally, judging versus perceiving.

Extravert students are described as risk takers, action oriented and sociable, they tend to talk out loud and to respond quickly in classrooms. In terms of communication, these students prefer verbal communication rather than written communication. On the other hand, introvert students tend to follow the opposite path, as they are more reflective and instead of giving a quick answer, they need to reflect upon the gathered information and contextualized it, in order to discuss it with their colleagues or instructors. Considering the second dimension, the sensing students pay more attention to detail and they like to develop a sequential work, while intuitive students tend to ignore the specifications and prefer to focus upon on concepts and patterns at first sight. Moreover, these students are innovative, so they enjoy chance and solving different problems. A feeling person makes decisions considering their personal values and gives high importance to harmony, in the meanwhile a thinking person places objectives at first place and makes decisions impersonally. Finally, flexibility is the proper word to describe the perceiving types, while the judging types like to have everything organized and well-structured in order to accomplish their goals.

In terms of results, it was possible to conclude that thinking students outperform feeling students in economics, while intuitive students tend to achieve higher grades and perform better on TUCE exams when compared to sensing students (Ziegert 2000).

Borg and Stranahan (2002) also analyzed the influence of personality type on student economics performance. In order to estimate the effect of different personality types on

educational outcome, the authors used the MBTI, i.e. the Myers-Briggs Type Indicator. This indicator classifies different types of personality according to four mental processes which, in turn, are related with perceiving processes or judging processes. In terms of perceiving processes, there are the intuitive people (I) and the sensing people (S), while the thinking process (T) and the feeling process (F) are two mental judging processes. Another dimension was considered in this article, namely, the extraversion and introversion. Afterwards, all these dimensions may be combined and result into different temperaments. The authors found that introvert students outperform extrovert students in economics classes, when course grade is used as the outcome measure. Students with SP personality (sensing and perceiving) have lower grades compared to students with SJ (sensing and judging) temperaments, as the SP students fit properly in the traditional school patterns.

Chowdhury and Amin (2006) followed a distinct methodology, as they considered two dimensions of personality type, conscientiousness and agreeableness, and they analyzed how the interaction between both types affected student attainment in principles of economics. Conscientiousness refers to the definition of goals, to a methodical and organized work, while students high in agreeableness strive to achieve common understanding, by being more generous, flexible, tolerant and cooperative. This last type has more utility in teamwork occasions. Students with higher levels of consciousness and agreeableness outperform those who describe lower levels on both dimensions.

Contrary to the previous studies, Opstad and Fallan (2010) found that personality type alone has no effect on student performance in economics.

2.4.1.3. Mathematical Skills

Other main finding was the contribution of mathematical basic skills, which can partially explain the existing gender gap, as women tend to do less well than men in mathematical and analytical areas. With a poorer performance in mathematics, females tend to develop lower expectations of getting higher grades in economics which, consequently, will affect their performance negatively. Notwithstanding, there is no evidence that female students achieve lower scores than males continuously, when quantitative skills are required or that

female students outperform male students in questions related to verbal skills repeatedly (Williams, Waldauer et al. 1992).

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With respect to mathematical aptitudes, the gender differences become significant around age 12 (7th grade) and extend all the way through the junior and senior high school years (Williams, Waldauer et al. 1992). According to the authors, the Math SAT has shown to be a key determinant of students' economics success on all types of exams, except for a format of examination, more specifically, essays.

Brasfield, Harrison et al. (1993) stated that having an array of business math courses completed gives a positive and significant contribute to students higher scores in economics. Lumsden and Scott (1987) defend that once a student achieves an "A" mark in mathematics, his/her success in the economic multiple-choice exam is granted.

On the other hand, Ballard and Johnson (2004) examined four distinct measures in order to determine whether math skills are relevant to student success in economics or not. The four measures included student score on a test evaluating the understanding of basic mathematical concepts, the student formation not only in calculus, as also in remedial mathematical and, finally, the student score on the Assessment Test (ACT). To proceed with their study, the authors employed a multiple-choice test to gauge the level to which students were able to understand basic algebra calculations. The results suggested that proficiency in basic algebra is the major determinant to improve student economics performance, in addition to other measures of math ability, such as math score on the ACT and prior math courses taken, which do not contribute to student economic literacy by itself.

In this regard, quantitative literacy proved to be crucial to students' level of economic literacy, affecting both pre-test and post-test scores while attending a course in economics. In other words, having certain basic mathematical skills, such as being able to solve an equation system or comprehending a graphic will definitely determine the learning and performance in these courses, as it will lead to higher economic knowledge when the

economic course in which the student is enrolled is completed (Schuhmann, McGoldrick et al. 2005).

Moreover, one standard deviation increase in the student's Algebra EOCT results in an increase of 20 percent of a standard deviation in the individual's Economics EOCT score, one standard deviation increase in the individual's Geometry score origins an increase of 38 percent of a standard deviation in the student Economics EOCT grade. A student prior performance in mathematics constitutes, though, a very important predictor of his/ her attainment in economics (Clark, Scafidi et al. 2011).

Table 2 - Gender Effect

| <u>Author/ Year</u> | <u>Country</u> | <u>Objective</u> | <u>Model</u> | <u>Findings</u> |
|----------------------------------|-----------------------|---|------------------------------|--|
| Siegfried (1979) | USA | To analyze when the gender gap appears and its effect on understanding and learning of economics. | | The learning and the understanding of economics at the elementary level school indicates few differences between sexes. By the high school, the gender gap appears to develop and it persists through the college years. |
| Williams, Waldauer et al. (1992) | USA | To comprehend the effect of gender on student scores in economics tests. | Pool (Panel) | Female students outperformed male students on the numerical and spatial components of the micro exams. |
| Buckles and Freeman (1983) | Columbia | To analyze when the male-female difference in terms of economic understanding happens and how this will affect their performance. | Ordinary Least Squares Model | Gender is not a determinant factor to students' economic success, either in terms of stock of economic knowledge or in terms of flow of new economic knowledge. |
| Lumsden and Scott (1987) | United Kingdom | To gauge male and female scores obtained in two evaluation formats, the essays and the multiple choice tests. | Ordinary Least Squares Model | Gender differences depend on the format of the examination. When multiple-choice tests are replaced by essays, the male-female difference is inverted or minimized (Ferber, Birnbaum et al. 1983). |
| Watts (1987) | Indiana | To determine the impact of gender on understanding or learning of basic economics concepts. | Ordinary Least Squares Model | Formal instruction appears to constitute an alternative to narrow male-female differences concerning the level of economic understanding. |
| Heath (1989) | USA | To analyze gender differences in economics, while correcting for self-selectivity bias. | Ordinary Least Squares Model | Male students have higher grades than female students by over 10 points. Men are also more likely to choose economics as an elective course than women. |
| Ballard and Johnson (2005) | Canada, USA | To discover which factors encourage the gender gap in an introductory undergraduate course. | Ordinary Least Squares Model | Expectations and gender differences affect students' performance. Males outperform females in economics, once their expectations affect their performance positively, conversely to females. |

Source: Own Elaboration

Table 3 - The Role of Personality Type

| <u>Author/ Year</u> | <u>Country</u> | <u>Objective</u> | <u>Model</u> | <u>Findings</u> |
|----------------------------|-----------------------|--|-------------------------------|--|
| Ziegert (2000) | USA | To estimate the effect of personality type on the learning of economics. | -Ordinary Least Squares Model | Thinking students outperform feeling students in economics, while intuitive students tend to achieve higher grades and perform better on TUCE exams when compared to sensing students. |
| Borg and Stranahan (2002) | North Florida, USA | To analyze the role of student personality type in upper level economics. | -Ordered Probit | Introvert students outperform extrovert students in classes of economics. Students with SP personality have lower grades compared to students with SJ temperaments, as the SP students fit properly in the traditional school patterns. |
| Chowdhury and Amin (2006) | USA | To examine the relationship between the interactive effects of consciousness and agreeableness and student academic achievement in an introductory economics course. | -Ordinary Least Squares Model | Students with higher levels of consciousness and agreeableness outperform those who describe lower levels on both dimensions. |
| Opstad and Fallan (2010) | Norway | To determine how the interaction between gender and personality traits affect students 'achievement in a Norwegian business school. | -Ordered Probit | Personality type alone has no effect on student performance in economics. |

Source: Own Elaboration

Table 4 – Mathematical Skills

| Author/Year | Country | Objective | Model | Findings |
|-------------------------------------|----------------|---|------------------------------|---|
| Lumsden and Scott (1987) | United Kingdom | To gauge male and female scores obtained in two evaluation formats, the essays and the multiple choice tests, controlling for other variables as math skills. | Ordinary Least Squares Model | Once a student achieves an “A” mark in mathematics, his/her success in the economic multiple-choice exam is granted. |
| Williams, Waldauer et al. (1992) | USA | To comprehend the gender gap in economic understanding. | Pool (Panel) | Math SAT has shown to be a key determinant of students’ economics success on all types of exams, except for a format of examination - essays. |
| Brasfield, Harrison et al. (1993) | USA | To determine the impact of having previous formation in economics at high school on learning and performance at college economics. | Ordered Probit | Having an array of business math courses completed gives a positive and significant contribute to students’ higher scores in economics. |
| Ballard and Johnson (2004) | USA | To determine whether math skills are relevant to student success in economics or not. | Ordinary Least Squares Model | Proficiency in basic algebra is the major key to improve student economics performance, in addition to other measures of math ability, such as math scores on the ACT and prior math courses taken. |
| Schuhmann, McGoldrick et al. (2005) | USA | To analyze the relationship between great math aptitude and higher economic learning. | Poisson regression | Having certain basic mathematical skills, such as being able to solve an equation system or comprehending a graphic will definitely determine the learning and performance in economics courses. |
| Clark, Scafidi et al. (2011) | USA | To present a review of recent developments on the field of economic education. | Survey | A student prior performance in mathematics constitutes, though, a very important predictor of his/ her attainment in economics. |

Source: Own Elaboration

2.4.2 Students' Attitudes toward economics

According to Crowley and Wilton (1974), students' attitudes towards economics are a relevant factor to take in consideration, when gauging student performance in economics courses. In other words, the usefulness of economics is susceptible of affecting student post-test score.

In this regard, Saunders (1980), after doing a survey including a set of questions regarding not only the students' interest in economics as a subject, as also the relevance they attribute to economics and whether they think economics should be required, the author came to two main prepositions. Student interest for economics appears to be positively correlated to his performance, whilst the belief that economics is a required discipline does contribute negatively to student attainment in economics, even though it has shown to have a weaker correlation with student performance on the hybrid TUCE.

Saunders (1980) has also analyzed the contribution of student reading habits to their performance in economics, which among weekly news magazines, financial and business sections, only the reading of the economics section of a weekly news magazine has shown to be statistically and significantly correlated to student test score.

Hahn (2006) has also reinforced the importance of reading to children higher achievement in economics. In this regard, the author investigated the quantity of books read by the students in a month and the results suggested that reading does improve elementary students' test score in economics, supporting the idea of learning by reading.

Brock (2011), however, found that students with prior knowledge in economics tend to have a more negative attitude towards the subject compared to students who have not gained knowledge in economics. Additionally and contrary to KRISTOF (2009), the author's results suggest that students financially naive, i.e. with no-saving experience and whose knowledge of economics is scarce, at the start of economics classes, tend to achieve better results compared to students who exhibit no knowledge gained.

Table 5 - Student Attitudes towards Economics

| <u>Author/ Year</u> | <u>Country</u> | <u>Objective</u> | <u>Model</u> | <u>Findings</u> |
|----------------------------|-----------------------|--|------------------------------|--|
| Crowley and Wilton (1974) | Canada | To compare the performance of economics students who have taken an introductory economics course and those who have not. To identify the factors affecting the posttest result of economics students. | Ordinary Least Squares Model | The belief that economics is a useful subject might affect student posttest score. |
| Saunders (1980) | Indiana | Despite this has not been the key study, the author also wanted to determine how students feel about introductory economics courses in terms of interest and difficulty. | Ordinary Least Squares Model | Student interest for economics appears to be positively correlated to his performance, whilst the belief that economics is a required discipline contributes negatively to student attainment in economics. Only the reading of the economics section of a weekly news magazine has shown to be statistically and significantly correlated to student test score. |
| Hahn (2006) | Korea and USA | To identify factors influencing children's economics tests results. | Ordinary Least Squares Model | Reading improves elementary students' test score in economics, supporting the idea of learning by reading. |
| Brock (2011) | Georgia | To analyze how students' attitudes towards economics affect their knowledge of economics or the opposite. | Ordinary Least Squares Model | Students with prior knowledge in economics tend to have a more negative attitude towards the subject compared to students who have not gained knowledge in economics. |

Source: Own Elaboration

2.4.3 Household Context

Concerning the family background, Lawson and O'Donnell (1986) found that children from low-income families and whose parents have no college education score two points below, in economics, than those whose parents' income is relatively high and who have college education. The author also analyzed the impact of vacation experience in children's knowledge of economics. The integration of this variable is claimed to represent the socioeconomic stimulation, and it proved to be statistically significant, by influencing positively children's economic attainment. The experience of being exposed to different atmospheres appears to affect their academic performance. Travelling brings implications to children's knowledge and understanding (Scoffham and David 1999), pages 132-133.

Walstad and Soper (1988) by measuring children's economic knowledge through the score obtained in the TEL found family income to be determinant to children performance in economics. The results suggested that students from high-income families and middle-income families tend to perform better in economic tests, as "High-Income" and "Middle-Income" variables are positively correlated to children's economic achievement and it has shown to be statistically significant as well.

Once more and according to Hahn (2006), the income variable is not only positively correlated to children performance in elementary level, as it is also statistically significant. More specifically, children from low-income families have a poor performance compared to children from middle-income families, who perform 0.64-.68 points higher than their counterparts. Finally, children from high-income families score 1.28-1.38 points higher than those from low-income environments. Thinking of parents' educational level, it has shown to be insignificant.

Another variable that may affect students' attainment in economics courses consists of their non-saving experience as a child or a young adult, which thinking of the current crisis is crucial. In other words, student previous ability to save might contribute to improve economics performance (KRISTOF 2009). Logically, having a bank account and understanding the importance of saving are two of the potential determinants to promote and to develop student saving experience and reasoning.

Table 6 - Household Context

| <u>Author/ Year</u> | <u>Country</u> | <u>Objective</u> | <u>Mode</u> | <u>Findings</u> |
|-----------------------------|-----------------------|---|--|---|
| Lawson and O'Donnell (1986) | USA | To identify the factors that might affect children economic experience. | ANOCOVA model – A combination of a standard regression analysis and an analysis of variance. | Children from low-income families and whose parents have no college education score two points below in economics than those whose parents' income is relatively high and who have college education. Vacation experience has proved to be statistically significant, by influencing positively children's economic attainment. Travelling brings implications to children's knowledge and understanding (Scoffham and David 1999). |
| Walstad and Soper (1988) | USA | To identify the factors that affect students' performance in economics. | Ordinary Least Squares Model | Students from high-income families and middle-income families tend to perform better in economic tests. |
| Hahn (2006) | Korea and USA | To identify factors influencing children economics tests results. | Ordinary Least Squares Model | The income variable is not only positively correlated with children performance in elementary level, as it is also statistically significant. Thinking of parents' educational level, it has shown to be insignificant. |

Source: Own Elaboration

2.4.4 Indirect Sources of Information

Despite not all children have access to formal economic instruction; they are exposed to several informal forms of economic education daily, for instance, via television or other type of media, or even through their parents' discourse or at school. Since early childhood, children observe economic transactions, by shopping with their parents, which can be identified as a direct experience or even by listening TV reports about unemployment or other consequences as a result of the current crisis. In other words, socially mediated forms of communication about economics play a crucial role providing children with more complex terms or concepts. Moreover, while at school by talking to teachers, at home by reading, watching news or talking to their parents, children are able to comprehend the dynamic of the adult economic world easily. To conclude, indirect sources of information and direct experience in the daily journey are two key elements supporting and stimulating children economic progress (Webley 2005).

2.4.5 Classroom Features

In this section, a brief literature review regarding the class size effect in children's economics performance will be presented. The empirical results on this issue have shown to be mixed.

Raimondo, Esposito et al. (1990) analyzed the impact of introductory courses class size on student performance in intermediate theory courses, gauging children performance through course grade rather than the TUCE score. The authors found that large class size only had repercussions on macroeconomics courses. In other words the increase of class size in introductory microeconomics courses did not bring implications to children performance in the intermediate microeconomics theory courses. On the other hand, students who took a large lecture in introductory macroeconomics had lower grades in the intermediate macroeconomics theory course contrary to those who enrolled in small introductory microeconomics classes. So, according to this study, it is possible to conclude that smaller classes have a positive effect on students' economic achievement.

(Siegfried and Kennedy 1995; Kennedy and Siegfried 1997) stated that class size has no effect on student attainment in introductory economics thereby the assumption that larger classes lead to a reduction of learning in principles of economics loses its feasibility. Kennedy and Siegfried (1997) also found that certain characteristics over which instructors have control do not significantly affect student achievement in economics.

However the results found in the earlier studies, and according to Becker and Powers (2001), might be biased by missing data problems. In other words, the researchers' findings are based only on students who fully completed the post-test thereby they tend to contemplate a more restricted sample compared to the one considered at the beginning, which includes the children's pre-test score, post-test score and student information. When the missing data is included and attrition is controlled by adjusting TUCE analysis, there is evidence of a statistically significant negative class size effect on student performance in economics. The relationship between class size and student performance is, though, sensitive to the measure of class size chosen, in this case, students who fulfill both pre-test and post-test.

In order to explore the relationship between class size and student achievement in principles of economics, Arias and Walker (2004) isolated the class size effect, by holding constant a set of variables across all sections, namely, class materials, process of evaluation, assignments and exams. The only existing difference was the class size. Even holding all else equal, students in smaller classes outperform students in larger classes. Small class size has a positive impact on student achievement in principles of economics.

Kokkelenberg, Dillon et al. (2008), on the other hand, established a negative relationship between class size and students' average grade point, for all subsets of data and departments. Moreover, the authors found diseconomies of scale associated with the decline of student outcomes as class size increases. In terms of more contemporary literature, it is possible to make reference to Tseng (2010), who conducted a class size effect study on managerial economics. Once more, students in a small-sized introductory economics class performed significantly better than students in a large-sized introductory economics class.

Table 7 - Class Size Effect

| Author/ Year | Country | Objective | Model | Findings |
|------------------------------------|---------------------|---|--|--|
| Raimondo, Esposito et al. (1990) | Boston, USA | To analyze the impact of introductory courses class size on student performance in intermediate theory courses. | Ordinary Least Squares Model | Smaller classes have a positive effect on students' economic achievement. |
| Siegfried and Kennedy (1995) | USA | To analyze how class size affects the learning of economics. | TUCE III survey | Larger classes do not lead to a reduction of learning in principles of economics. |
| Kennedy and Siegfried (1997) | USA | To gauge the impact of class size on students' attainment in introductory economics courses. | GLS regression | Larger classes do not lead to a reduction of learning in principles of economics. |
| Becker and Powers (2001) | USA | To measure the consequence of excluding students for whom data is missing. To analyze the effect of attrition from pretest and posttest. | Ordinary Least Squares Model Probit Model | When the missing data is included and attrition is controlled by adjusting TUCE analysis, there is evidence of a statistically significant negative class size effect on student performance in economics. |
| Arias and Walker (2004) | Georgia, USA | To analyze the impact of class size on students' economics performance. | Ordinary Least Squares Model Probit Model | Small class size has a positive impact on student achievement in principles of economics. |
| Kokkelenberg, Dillon et al. (2008) | Northeast, USA | To determine the class size effect on students' higher education average grade point. | -Ordered Logit | There is a negative relationship between class size and students' average grade point. The authors found diseconomies of scale associated with the decline of student outcomes as class size increases. |
| Tseng (2010) | North Carolina, USA | To determine the impact of introductory microeconomics course class size on students' performance in managerial economics. | -Ordered Logit | Students in a small-sized introductory economics class are likely to achieve higher grades in the managerial economics course than students in a large-sized introductory economics class. |

Source: Own Elaboration

2.5 Final Considerations

The current study has two fundamental research issues: the first is to investigate the efficacy of implementing economic programs on children and, secondly, it has the purpose of examining the factors determining students' performance in economics and their attitudes towards it.

After an extensive literature review, it was possible to bring together the factors that might justify students' discrepancies in terms of economic understanding and learning. Apart from being (or not) through an economic program about economics, students' personal characteristics such as age, gender, personality type and mathematical abilities, students' attitudes towards economics, family socioeconomic background including parents' education, and, finally, classroom features are central factors likely to influence students' economics attainment. Additionally, economic instruction is a crucial requisite to achieve economic understanding and reasoning in young children (Kourilsky 1977), in which economic programs might play a crucial role.

Based on the literature review and thinking of testing the efficiency of economic programs, we derive the following Hypothesis:

H1: Students who had gone through an economics instruction program are expected to achieve higher scores in economics tests, when compared to those who did not receive formal economics instruction.

H2: Students who had gone through an economics instruction program are expected to have a higher variation of economics knowledge, measured before and after the completion of the economics program, compared to those who did not receive formal economics instruction.

The study 1 reported in section 4.2.2 addresses primarily Hypothesis 1, while the study 2 reported in section 4.3.2 addresses the Hypothesis 2.

While investigating for the impact of those variables on student achievement and despite the project's sample being focused on children attending 3rd and 4th elementary grade levels, it

became evident that the majority of studies and methods of evaluation of the level of economic literacy were mostly oriented to the American educational system and to educational levels superior to the elementary level. One of the goals of this study is hence to enrich literature, by measuring the level of economic literacy at elementary grade level and by supporting the argument that economic programs for children are efficient on the dissemination of economic knowledge. This work has also the purpose of promoting children's interest for economics.

3 Methodology

3.1 Summary

This project had two distinct assignments, the pre-implementation test and the post-implementation test. In a first stage, students were administered a Questionnaire of Economic Literacy (QEL), in a format of pre-implementation test. Here, the students had not been exposed to formal instruction in economics.

In a second stage, and after completing the economics program, the Questionnaire of Economic Literacy (QEL), in a format of post-implementation test was applied. Here, the students had been exposed to formal economics instruction, as Professors and researchers from Aveiro's University, with previous economic formation and in-service experience, administered basic economic concepts to children who participated in the "Economicando" program.

The difference from the first questionnaire to the second questionnaire consists of the inclusion of questions related to socioeconomic and demographic characteristics, which do not appear in the first questionnaire.

3.2 The Survey Instrument

Thinking of economic education, the assessment existing tools are only adapted to four different educational levels, namely, the Basic Economics Test to children from 5th to 6th grades (11-12 years old), the Test of Economic Knowledge to student from 7th to 9th grades (14-15 years old), the Test of Economic Literacy to student from 11th and 12th grades and, finally, the Test of Understanding College Economics for students who are attending college principles courses. Furthermore, these tools are nationally normed assessment instruments, capable of measuring students' economic knowledge and understanding either in pretest or posttest (Bethune and Ellis 1999).

Due to the requirement of reading comprehension in the tests mentioned above and the expectable lack of this ability in lower grades, it is understandable that there is no direct way to evaluate students' economic understanding below 5th grade (Bethune and Ellis 1999).

Considering the existing gap, Bethune and Ellis (1999) developed a ten questions multiple-choice test, which did not require reading comprehension skills. The authors' purpose was to administer this test to kindergarten through second grade classes, in order to measure students' understanding of very basic economic principles, using a pre and post-test format.

To administer multiple-choice tests as an assessment tool has several advantages, more specifically, teachers are able to include a major quantity of the covered material during classes and, they can also measure with greater exactitude their students' understanding, as there is the possibility of including a set of questions regarding a single topic which, subsequently, will increase the assessment depth. Also by applying a multiple-choice test, it becomes possible to erase the possibility of existing bias, as the vagueness is scarce and both questions and answers are concrete and objective (Saunders and Walstad 1990), cited in (Bethune and Ellis 1999).

Similar to other studies, for instance Ballard and Johnson (2005); Roos, Chiroro et al. (2005) or Brock (2011), and thinking of the advantages of administering a multiple-choice test, a Questionnaire of Economic Literacy in a format of pre-implementation test and post-implementation test, and including a set of multiple-choice questions, was applied (see appendix 14).

It is, though, important to mention that this project had two distinct assignments, the pre-implementation test and the post-implementation test. In a first stage, students were administered a Questionnaire of Economic Literacy (QEL), in a format of pre-implementation test, to measure their prior knowledge and understanding of economics. Here, the students had not been exposed to formal instruction in economics. In a second stage, and after completing the economic program, the Questionnaire of Economic Literacy (QEL), in a format of post-implementation test was applied, in order to test the efficiency of the economic program. The difference from the first questionnaire to the second questionnaire consists of the inclusion of questions related to socioeconomic and demographic variables, which do not appear on the first questionnaire.

The second survey instrument contains two sections. The introductory section of the survey includes 37 multiple-choice questions, whose purpose consists of testing children's understanding and learning of basic economic concepts which, consequently, are considered to be fundamental to be economically literate. The questions can be subdivided in four distinct groups, (1) basic economic concepts; (2) microeconomics concepts; (3) macroeconomics concepts and (4) international economy concepts. In terms of microeconomics concepts, it is possible to highlight questions related to demand vs supply, market functioning, price and costs, production vs consumption; the bank and its role; macroeconomics concepts covers issues related to unemployment, the gross domestic product, inflation, public expenses, economic development; concepts of scarcity, opportunity cost, good and service concepts, resources, economic systems can be classified as basic economic concepts and, finally; the international economy concepts include questions regarding export and import matters.

The second section of the survey addresses both the student educational background and the socioeconomic characteristics of the students' parents. Questions are used to identify learning outcomes across main fields of study, gender, age, personality type and mathematical skills. Students were also asked about their parents' education level and profession, and about their perception of household income and financial difficulties. This section purpose is to analyze, in a total of 17 questions, the impact of demographic and socioeconomic variables on students' understanding and learning of economics.

Additionally, 12 questions were included to test students' interest and attitudes towards economics, as well to analyze their daily economic experience, either at home, by talking to their parents or watching news, or at school by talking to their teacher about economic issues. The recognition of the importance of saving in a context of crisis, as well the familiarity with financial institutions, by having a bank account were also taking into consideration, as it reports children's economic experience and awareness.

Table 8 discriminates the questions accordingly to the seven areas in analysis on the Questionnaire of Economic Literacy.

Table 8 - Economic Themes included in the QEL

| Theme/ Concepts | Group of Questions | Total | Perc. (%) |
|--|---|--------------|------------------|
| Economy and Consumer | 4, 13, 21, 27, 31, 37 | 6 | 16.2 |
| Economy and Production | 1, 3, 5, 16, 18, 19, 22, 28, 29, 34, 35, 36 | 12 | 32.4 |
| The Role of Government | 11, 14, 23, 24 | 4 | 10.8 |
| The European Union | 9, 26 | 2 | 5.4 |
| International Economy | 6, 15, 20 | 3 | 8.1 |
| Inflation, currency and interest rate | 2, 7, 8, 10, 25, 30, 32, 33 | 8 | 21.6 |
| Economy of Innovation and Entrepreneurship | 12, 17 | 2 | 5.4 |
| | Total: | 37 | 100 |

Source: Own Elaboration

3.3 Data Collection

The data for this study were collected using a sample of students from five different schools. All students from the 3rd and 4th grades of five schools located in Aveiro were asked to complete a questionnaire, in a format of pre-implementation test and post-implementation test as it was already mentioned above.

The pre-implementation questionnaire was implemented in the fall semester of 2010/ 2011 school year. The post-implementation questionnaire was implemented in the fall semester of 2011/2012 school year, after the completion of the economic instruction program. The professors asked children to complete the survey in class.

In between, a group of these students were exposed to formal economics instruction - the control group - as teachers from Aveiro's University, with previous economic formation and in-service experience, administered basic economic concepts to children who participated in the "Economicando" program, in order to test the effect of formal economics instruction on children's learning of economics in contrast to those who had not been exposed to formal economics instruction. Additionally, this study has as ultimate goal the identification of the factors contributing to a higher level of economic literacy.

The dissemination of economic knowledge was made through a set of six activities including: a game following the traditional format “Jogo de tabuleiro- Economicando”, two computer-based activities, “Sopa de letras” and “Ou Isto ou Aquilo”, a book called “A Economia Sobe e Desce” and an exhibition called “Exposição em movimento” with 14 posters focusing on economic concepts, and, finally, a computer game “Inflation”. The different activities were administered to students inserted in a traditional lecture format.

3.4 The sample

For the purpose of this thesis we considered the students who did both the pre and the post-implementation tests, and also all students who did only the post-implementation test. Doing so, it is possible to investigate our research issues through two different studies, reported in sections 4.2.3 and 4.3.3.

Table 9 gives an overview of the sample structure for the post-implementation questionnaire. Out of these, 99 students went through the economic program (out of these, only 84 had conducted the first questionnaire also).

Table 9 – Sample Description for the Post-Implementation Questionnaire

| School | Total Number of Students | Sex | | Year of Schooling | | Class Size |
|--------------|-----------------------------------|--------|------|-------------------------|-----------------|------------|
| | | Female | Male | 3 rd | 4 th | |
| 1 | 150 | 68 | 59 | 74 | 76 | 25 |
| 2 | 152 | 65 | 65 | 57 | 95 | 21 |
| 3 | 48 | 21 | 21 | 24 | 24 | 24 |
| 4 | 97 | 44 | 44 | 56 | 41 | 19 |
| 5 | 19 | 9 | 9 | 12 | 7 | 10 |
| Total | 466 | 207 | 198 | 223 | 243 | ... |

Source: Own Elaboration

Note that, by analyzing the questionnaire, it was possible to verify that a group of 22 students from a specific school had all the same answers, from which we realized that the teacher helped them to complete the questionnaire. This group was eliminated from the study thereby only 444 from the 466 students were considered to be valid.

The table 10 gives an overview of the 233 students that conducted the first and the second questionnaires. Out of these, 84 went through the economic program.

Table 10 – Sample Description for the Second Study

| School | Number of Students | Sex | | Year of Schooling | | Class Size |
|--------------|--------------------|--------|------|-------------------|-----------------|------------|
| | | Female | Male | 3 rd | 4 th | |
| 1 | 72 | 38 | 34 | 0 | 72 | 26 |
| 2 | 91 | 45 | 46 | 0 | 91 | 24 |
| 3 | 15 | 9 | 6 | 0 | 15 | 24 |
| 4 | 37 | 21 | 16 | 0 | 37 | 21 |
| 5 | 18 | 10 | 8 | 11 | 7 | 9 |
| Total | 233 | 123 | 110 | 11 | 222 | ... |

Source: Own Elaboration

3.5 Final Considerations

Out of the 444 students who were submitted to the post-implementation test, only 99 went through the economic program. It is, though, expected that this group will have a greater percentage of correct answers in the QEL, compared to those students who had no economics instruction. This will be empirically tested in section 4.2.3.

Out of the 233 students that conducted the first and the second questionnaires, 84 went through the “Economicando” program thereby it is expected that the group of students who were exposed to formal economics instruction will have a higher variation of economic knowledge in comparison to the group who did not receive formal economics instruction. This will be empirically tested in section 4.3.3.

4 Are children able to learn about economic matters?

4.1 Summary

In this chapter we address empirically our central research issues: 1) testing the efficiency of the economic program applied to the students, and, doing so, we contribute also to the discussion about children's capacity and ability to understand and learning about economic matters; 2) to identify the factors, apart from economics instruction, which might affect children's test scores in economics.

To do so, we conducted two studies. Study 1 is based upon a sample of students who responded to the post-implementation questionnaire only. The Study 2 addresses the same issues through an alternative form, based upon the students that replied to both, the pre and post-implementation tests. Each study relies upon descriptive statistics and an econometric application.

4.2 Level of economic literacy post-implementation: study 1

The first study intends to analyze how student individual characteristics and abilities; student attitudes and motivation towards economics, student socioeconomic background and class context affect the level of economic literacy, measured through the percentage of correct answers obtained in the QEL, represented as "A_QEL". Moreover and more important, the main goal consists of testing the efficiency of the economic program administered to children, gauged through the "instruction" variable.

4.2.1 Variables

Based on the literature, we considered a set of variables likely to influence children's knowledge of economics. The factors selected for the first study are presented in appendix 1. The variable "instruction" is expected to be positively correlated to student performance in economics.

Early instruction in economic principles on the primary grade-level – kindergarten through third or fourth grades, adapted to students' needs might provide children with a solid understanding of economics, by exposing them to economic conceptions and moreover by providing them the skills to apply the knowledge acquired in the economic lessons

(Hawthorne, Rodgers et al. 2003). Kourilsky (1977), Berti, Bombi et al. (1986), Ajello, Bombi et al. (1987), Laney (1988) and Laney (1999) also have found a positive relationship between student results in economics and targeting economic programs at schools.

To measure student individual characteristics, a set of variables was analyzed, namely, age, gender, the type of personality (thinking_vs_feeling; judging_vs_perceiving) and maths_grade. The expected signal for student age is also positive. As stated by Walstad and Rebeck (2002), age increases economic knowledge.

Thinking of gender, the literature is mixed, nevertheless and according to Siegfried (1979), the existing achievement differences between sexes appear to occur after early elementary years and prior to college, being insignificant at primary grade level.

In terms of personality type, it is not possible to arrive to a single conclusion. Ziegert (2000) results have suggested that thinking students outperform feeling students in exams, while judging students tend to earn higher grades in comparison to perceiving students. In this regard, the perceiving type has shown to be negatively correlated to student performance and therefore the expected signal for the variables “thinking_vs_feeling and “judging_vs_perceiving” is positive. Conversely and according to Opstad and Fallan (2010), personality type alone has no effect on student performance in economics.

Finally, having certain basic mathematical skills, such as being able to solve an equation system or comprehending a graphic will definitely determine the learning and performance in economics courses, as it will lead to a higher economic knowledge once the course in which the student is enrolled is completed (Schuhmann, McGoldrick et al. 2005). It is, though, possible to conclude that the expected signal for the variable “maths_grade” is positive.

Students’ attitudes towards economics are also important contributing factors to a higher or lower level of economic literacy. In this topic, variables as “int_economics”, “imp_economics”, “news” and “reading” are included.

Saunders (1980) found that student interest for economics appears to be positively correlated to his performance, whilst the belief that economics is a required discipline does contribute negatively to student attainment in economics. The variable “int_economics” is, though, expected to influence children’s level of economic literacy positively, while the variable “imp_economics” is negatively correlated to “A_QEL”.

“Reading”, on his turn, improves elementary students’ test scores in economics, supporting the idea of learning by reading (Hahn 2006). The expected signal for this variable is also positive.

Listening TV reports about unemployment or other consequences as a result of the current crisis, in other words, being exposed to socially mediated forms of communication where economic issues are discussed, plays a crucial role providing children with more complex economic terms or concepts (Webley 2005). In this regard the variable “news” has a positive impact on children’s level of economic literacy.

Thinking of the household context, “father_educ”, “mother_educ”, “income”, “travelling”, “bank_account”, “p_economics” and “p_saving” are the variables explored.

Lawson and O'Donnell (1986) found that children from low-income families score two points below, in economics, compared to those whose parents’ income is relatively high.

According to Hahn (2006), the “income” variable is not only positively correlated to children’s performance in elementary level, as it also proved to be statistically significant. In this regard, the variable “income” is expected to be positively correlated to student economic knowledge. Here, children’s income perception was used as a proxy for family income.

The influence of the “father_educ” and “mother_educ” variables is inconclusive. According to Lawson and O'Donnell (1986) , children whose parents have no college education perform poorer in economics compared to those children whose parents have college education. Notwithstanding, Hahn (2006) have found that parents’ educational level is insignificant to children’s performance in economics.

The vacation experience claimed to represent the socioeconomic stimulation, and it proved to be statistically significant, by influencing positively children’s economic attainment (Lawson and O'Donnell 1986).

Student previous ability to save might contribute to improve economics performance (KRISTOF 2009). Logically, having a bank account and understanding the importance of saving are two of the potential determinants which might promote and developing student saving experience and reasoning. The expected signal for “bank_account” and “psaving” is thereby positive.

By talking to their parents, children are able to comprehend the dynamic of the adult economic world easily. Indirect sources of information in the daily journey support and

stimulate children economic progress (Webley 2005). The expected signal for “peconomics” is also positive.

Finally and considering the classroom inputs, “class_economics, “class_size” and the school context, represented by each one of the classes were the last variables to be introduced.

Once more, as stated by Webley (2005), while at school by talking to teachers, children are able to comprehend economic matters more easily. This is also considered to be an indirect source of information.

The empirical results on class size effect have shown to be mixed. For instance, Arias and Walker (2004) found that small class size has a positive impact on student achievement in principles of economics. Kokkelenberg, Dillon et al. (2008), on the other hand, established a negative relationship between class size and students’ average grade point, for all subsets of data and departments.

The reputation of the school attended, or in other words, the school context might also influence children’s economic performance (Koshal, Gupta et al. 2008).

Once the definition of the variables is concluded, it is appropriate to proceed with the econometric regression.

4.2.2 The Econometric Model

In this case and considering that the purpose of the current study consists of analyzing the relationship between an endogenous (or dependent) variable, y , and a group of exogenous (or independent) variables, x_1, x_2, \dots, x_k , a multiple regression appears to be the proper solution to proceed with the estimation. The functional form of the model adopted is:

Equation 1:

$$y_i = \beta_0 + \beta_1 x_{1i} + \beta_2 x_{2i} + \dots + \beta_k x_{ki} + u_i$$

Where y is the dependent variable; β_0 is the intercept term, $\beta_1, \beta_2, \dots, \beta_k$ are the partial regression coefficients; x_1, x_2, \dots, x_k the explanatory variables (or regressors), u is the stochastic disturbance term and i the i th observation, more specifically, $i = 1, 2, \dots, n$.

For this specific study, the model can be presented as:

Equation 2:

$$\begin{aligned}
A_QEL_i = & \beta_0 + \beta_1 instruction_{1i} + \beta_2 age_{2i} + \beta_3 sex_{3i} + \beta_4 thinking_vs_feeling_{4i} + \\
& \beta_5 judging_vs_perceiving_{5i} + \beta_6 maths_grade_{6i} + \beta_7 int_economics_{7i} + \\
& \beta_8 imp_economics_{8i} + \beta_9 news_{9i} + \beta_{10} reading_{10i} + \beta_{11} entrepreneur_{11i} + \\
& \beta_{12} university_{12i} + \beta_{13} father_educ_{13i} + \beta_{14} mother_educ_{14i} + \beta_{15} income_{15i} + \\
& \beta_{16} travelling_{16i} + \beta_{17} bank_account_{17i} + \beta_{18} psaving_{18i} + \beta_{19} peconomics_{19i} + \\
& \beta_{20} class_economics_{20i} + \beta_{21} class_size_{21i} + \beta_{22} a_1_{22i} + \beta_{23} b_1_{23i} + \beta_{24} c_1_{24i} + \beta_{25} a_2_{25i} \\
& + \beta_{26} b_2_{26i} + \beta_{27} c_2_{27i} + \beta_{28} d_2_{28i} + \beta_{29} a_3_{29i} + \beta_{30} a_4_{30i} + \beta_{31} b_4_{31i} + \beta_{32} c_4_{32i} + \\
& \beta_{33} a_5_{33i} + u_i
\end{aligned}$$

The OLS is used to estimate the coefficients of a linear regression. The regression model was built assuming the following assumptions to be valid:

- (1) $E(u_i) = 0$.
- (2) $V(u_i) = \sigma^2$ for all i .
- (3) u_i and u_j are independent for all $i \neq j$.
- (4) u_i and x_j are independent for all j and i .
- (5) u_i follow a normal distribution for all i .
- (6) The independent variables are not expressed as an exact linear function of the others, in other words, there are no inter-correlations among the explanatory variables.

In order to test the presence of heteroscedasticity, a Breusch-Pagan-Godfrey test was conducted. According to the results displayed in the table presented in appendix 2, both the F test and the LM (obs*R-squared) conclude for the no rejection of the null hypotheses of homoscedasticity, once the p-value is higher than 5%.

To test the normality question, a histogram-normality test was run, which simultaneously perform the Jarque-Bera statistic. Considering the Jarque-Bera test of normality, the JB value is 3.0552 with a p-value of 0.217. It is also important to notice that the skewness value is 0.2653 and the kurtosis value is 3.0210. Therefore, it is possible to conclude that the residuals in this sample are normally distributed.

A Breusch-Pagan LM Serial Correlation Test was also conducted. Once the Obs*R-squared is higher than 5% percent, 0.5115, it is possible to infer that the disturbance term relating to any observation is not affected by the disturbance term relating to any other observation. This result reinforces the Durbin-Watson test, d-statistic = 1.71, which is close to 2, providing statistical evidence that there is no serial correlation in the error terms.

One coefficient to evaluate the existence of multicollinearity is called tolerance (TOL), which is the inverse of the VIF (Variance Inflation Factors). The tolerance factors of each independent variable are reported in appendix 2. Once all of them are higher than 0.5 and close to 1.0, it becomes clear and as stated by Gul and Fong (1993) that there is low inter-correlation and thereby the multicollinearity does not constitute a problem to the estimation of the regression coefficients. It is still important that once multicollinearity is detected, a solution is to drop one or more of the collinear variables (Gurajati 2003), page 365. In this regard, the “a_1”, “a_2”, “a_5” and “mother_educ” variables have been removed from the estimation. “a_5” has been removed because it is extremely correlated to class size, while “a_1” and “a_2” are extremely correlated to the core variable “instruction”. Finally, the “mother_educ” variable is highly correlated to “father_educ”, therefore we opted for remove it from the model. Past research has shown that maternal education is vital to a child’s development, once mothers with a higher level of literacy tend to use a more complex vocabulary when talking to their children and to encourage reading and schooling activities instead of television (Hofferth and Sandberg 2001). However and in this specific case, the “mother_educ” variable has shown to be statistically insignificant, conversely to “father_educ”. As mentioned in Gurajati (2003), pages 365 and 366, it is still important to have in consideration that by removing variables, a specification bias or specification error may be committed due to an incorrect specification of the model, however in this particular case, the model become significantly better and more accurate to the economic theory.

4.2.3 Results of Study 1

Level of economic knowledge

The table displayed below presents the level of economic literacy of those children who were not exposed to formal economics instruction in contrast with the control group who have

received formal instruction. The level of economic literacy, table 11, was measured by the percentage of correct answers – “A_QEL”, obtained in the Questionnaire of Economic Literacy (QEL).

Table 11 – Percentage of correct answers in the QEL

| | Instruction | Mean | N | Std. Deviation | Minimum | Maximum |
|-------|-------------|----------|-----|----------------|---------|---------|
| A_QEL | 1 | 0.612067 | 99 | 0.2164337 | 0.1351 | 0.9459 |
| | 0 | 0.547748 | 345 | 0.1664239 | 0.1081 | 0.8919 |
| | Total | 0.562089 | 444 | 0.1805224 | 0.1081 | 0.9459 |

Source: Own Elaboration

According to the results obtained in the table 11, 99 students attending 3rd and 4th elementary grade levels, from a universe of 444 students, received formal economics instruction, which has shown to be determinant to children’s economic performance in the QEL. In other words, children who received formal economics instruction obtained an average result of 61.2% (23 correct answers in a total of 37 questions) in the QEL, with a minimum result of 13.5% and a maximum result of 94.6%. On the other hand, children who had no formal instruction obtained an average result of 54.8% (20 correct answers in a total of 37 questions), with a minimum result of 10.8% and a maximum result of 89.2%.

Considering the table presented in appendix 3 and as the Levene’s Test for Equality of Variances is 0.000, i.e. it is less than 5%, than the null hypotheses of equal variances is rejected and only the test t presented in the row “Equal variances not assumed” is considered. The p-value of the test t is equal to 0.007, which is less than 5%, therefore it is possible to conclude that the difference of percentage of correct answers for both groups, those who received formal economics instruction and those who did not receive formal economics instruction is significant.

Thinking of the Portuguese scale of 0-20 points, children who received formal instruction achieved a score of 12 points, while children who did not receive formal instruction obtained a result of 10 points. Despite the low level of economic literacy among children, it becomes evident and with a significant difference of nearly 10%, that having economics instruction affects children’s economics performance at school as expected. The low level of economic literacy might be explained for other contributing factors such as demographic or socioeconomic variables.

Children's Individual Characteristics

The table displayed below presents the level of economic literacy according to children's individual characteristics, namely, age, sex, personality type and mathematical skills. The level of economic literacy, displayed in table 12, was measured by the percentage of correct answers – “A_QEL” - obtained in the Questionnaire of Economic Literacy (QEL).

Table 12 – Descriptive Statistics regarding the percentage of correct answers obtained in the QEL accordingly to children’s individual characteristics

| | | Mean | Std. Deviation | Maximum | Minimum |
|-------------------------|----------------|--------|----------------|---------|---------|
| Age*** | 7 | ,70270 | | ,703 | ,703 |
| | 8 | ,45516 | ,151724 | ,838 | ,108 |
| | 9 | ,57970 | ,169000 | ,919 | ,162 |
| | 10 | ,61696 | ,179894 | ,946 | ,135 |
| | 11 | ,37838 | ,144285 | ,568 | ,216 |
| | 12 | ,21622 | | ,216 | ,216 |
| | 13 | ,32432 | ,038222 | ,351 | ,297 |
| Gender | Male | ,57084 | ,179185 | ,946 | ,135 |
| | Female | ,56442 | ,185368 | ,919 | ,108 |
| Personality Type | Thinking*** | ,57862 | ,172395 | ,108 | ,946 |
| | Feeling | ,45817 | ,208494 | ,135 | ,865 |
| | | | | | |
| | Judging*** | ,57525 | ,175882 | ,919 | ,135 |
| | Perceiving | ,49850 | ,196300 | ,946 | ,135 |
| Maths Grade*** | Unsatisfactory | ,45270 | ,230074 | ,892 | ,135 |
| | Satisfactory | ,53296 | ,204393 | ,919 | ,135 |
| | Good | ,57244 | ,162339 | ,892 | ,162 |
| | Excellent | ,59622 | ,167053 | ,946 | ,135 |

*** significant at 1% level; ** significant at 5% level, *significant at 10% level

Source: Own Elaboration

Our results, reported in appendix 4, indicate that age is statistically significant (ANOVA test for differences, sig. at 1% level of significance), but the relationship with the level of economic literacy is not linear. On the other hand, sex has shown to be insignificant, with a p-value equal to 0.719.

In terms of personality type, the variable “thinking_vs_feeling” has shown to be statistically significant at 1% level of significance, p-value = 0.000, and students with a thinking personality type obtained an average result of 57.86% in the QEL, while students with a feeling personality type only achieved a result of 45.82%. Meanwhile, students who have a judging personality type outperformed students who have a perceiving personality type, by achieving an average result of 57.53% against 49.85%.

Finally, having mathematical skills has also shown to be determinant and statistically significant at 1% level of significance, p-value = 0.003. Students who have excellent marks at math have a higher level of economic literacy, achieving an average result of 59.62% in the QEL, while children who have unsatisfactory marks obtained an average result of 45.27% in the QEL.

Student's Attitudes towards Economics

The table displayed below presents the level of economic literacy according to children's attitudes towards economics, the interest for the discipline, the importance given to economics, the habit of watching news and reading, as well the intention to go to college and to be an entrepreneur. The level of economic literacy, table 13, was measured by the percentage of correct answers – "A_QEL" - obtained in the Questionnaire of Economic Literacy (QEL).

Table 13 – Descriptive Statistics Regarding the percentage of correct answers obtained in the QEL according to children's attitudes towards economics

| | | Mean | Std. Deviation | Maximum | Minimum |
|---|--|--------|----------------|---------|---------|
| <u>Int_economics***</u> | Interesting | ,57604 | ,174451 | ,946 | ,108 |
| | Not interesting | ,48838 | ,193340 | ,919 | ,162 |
| <u>Imp_economics***</u> | Important | ,58171 | ,170564 | ,946 | ,108 |
| | Not important | ,41633 | ,173210 | ,784 | ,135 |
| <u>News</u> | If the child watches news | ,56586 | ,176638 | ,946 | ,135 |
| | If the child does not | ,53418 | ,157457 | ,811 | ,243 |
| <u>Reading***</u> | Does not read | ,44595 | ,168867 | ,811 | ,135 |
| | Only academic books | ,38122 | ,198790 | ,892 | ,108 |
| | Academic books, infant-juvenile literature | ,57073 | ,153624 | ,892 | ,189 |
| | Journals, magazines and books. | ,58714 | ,176004 | ,946 | ,135 |
| <u>Entrepreneur</u> | Intends to be! | ,57360 | ,174486 | ,919 | ,135 |
| | Does not intend to be! | ,55676 | ,184467 | ,946 | ,108 |
| <u>University***</u> | Wants to go to university | ,57858 | ,177198 | ,946 | ,108 |
| | Does not want to | ,44120 | ,162044 | ,865 | ,135 |
| *** significant at 1% level; ** significant at 5% level, *significant at 10% level | | | | | |

Source: Own Elaboration

In this specific case, both "int_economics" and "imp_economics" have proved to be statistically significant at 1% level of significance, p- value = 0.001 and p-value = 0.000 respectively. Nevertheless and in terms of the variables' impact, children who have shown interest for economic issues achieved an average result of 57.60% in the QEL, against 48.84%

obtained for those students who have no particular interest in learning economics. Additionally, students who have the belief that economics is important to their future achieved an average result of 58.17% in the QEL, outperforming those who do not see economics as an important discipline.

The practice of watching news has shown to be insignificant to children's increase of economic knowledge, with a $p\text{-value} = 0.468$. Conversely, reading has shown to be statistically significant at 1% level of significance, $p\text{-value} = 0.000$. Students who read journals, magazines and books achieved an average result of 58.71%, while those who do not enjoy reading achieved a lower result of 44.60%.

The ambition of being an entrepreneur has shown to have no impact on children's percentage of correct answers in the QEL. Finally, the intention to go to college has shown to be significant once more at 1% level of significance, $p\text{-value} = 0.000$. Students who intend to attend college achieved an average result of 57.86%, whilst those who do not intend to go to university achieved a result of 44.12%.

Household Context

The table displayed below presents the level of economic literacy according to children's family environment, more specifically, the father educational level, the children's income perception, the experience of travelling and having a bank account, as well the common practice of talking about economic matters and the importance of saving within family's members. The level of economic literacy, table 14, was measured through the percentage of correct answers – “A_QEL” - obtained in the Questionnaire of Economic Literacy (QEL).

Table 14 – Descriptive statistics regarding the percentage of correct answers obtained in the QEL according to children’s family background

| | | Mean | Std. Deviation | Maximum | Minimum |
|---|--|--------|----------------|---------|---------|
| <u>Father educ</u>*** | Low Qualification | ,47059 | ,183570 | ,811 | ,216 |
| | Medium Qualification | ,56642 | ,172349 | ,919 | ,135 |
| | High Qualification | ,59496 | ,165381 | ,919 | ,162 |
| <u>Income</u>*** | Not enough for regular expenses | ,49046 | ,184406 | ,865 | ,135 |
| | Money for basic expenses | ,55106 | ,182053 | ,919 | ,135 |
| | Money= Almost Everything | ,61864 | ,164174 | ,946 | ,243 |
| | Money = Everything | ,47128 | ,152878 | ,670 | ,108 |
| <u>Travelling</u>* | If the child knows other countries | ,57325 | ,173505 | ,919 | ,108 |
| | Otherwise | ,53619 | ,197358 | ,919 | ,135 |
| <u>Bank account</u>*** | If the child has a bank account | ,58635 | ,167654 | ,919 | ,135 |
| | If the child does not have it | ,51373 | ,196941 | ,946 | ,108 |
| <u>Psaving</u>*** | If parents talk about the importance of saving | ,57887 | ,1178163 | ,919 | ,108 |
| | If they do not | ,48815 | ,171526 | ,946 | ,162 |
| <u>Peconomics</u>*** | If parents talk about economic matters | ,61054 | ,167725 | ,919 | ,108 |
| | If they do not | ,47982 | ,16867 | ,946 | ,135 |
| *** significant at 1% level; ** significant at 5% level, *significant at 10% level | | | | | |

Source: Own Elaboration

The father educational level has shown to be statistically significant at 1% level of significance, with a p-value = 0.009. In this regard, it is possible to conclude that children whose father has more years of schooling, more specifically, medium-high educational level outperform those whose father has fewer years of schooling. More specifically, children from families whose father has a medium-high educational level achieved an average result of 56.64% and 59.50%, while children from families whose father has a lower level of education obtained an average result of 47.06%.

Considering family’s income, this has shown to be significant at 1% level of significance. Children from low-income families achieved an average result of 49.05% in the QEL.

Children from middle-income families achieved an average result of 55.11% and 61.87%. However, children from high-income families achieved an average result of 47.13%.

The experience of travelling has shown to be significant at 10% level of significance ($p\text{-value} = 0.086$), whilst having a bank account has shown to be significant at 1% level of significance ($p\text{-value} = 0.000$). Children who often travel with their parents and get to know different countries obtained an average result of 57.33%, while those who did not travel abroad achieved an average result of 53.62%. Children who have a bank account achieved an average result of 58.64% in the QEL, while those who did not have a bank account achieved an average result of 51.37%.

Talking about economic matters and the importance of saving with family's member has also shown to be significant at 1% level of significance. Children whose parents talk about both themes achieved an average result of 57.89% and 61.05% in the QEL respectively, while children who do not have this type of experience achieved an average result of 48.82% and 47.98%, slightly lower.

Classroom Context

The table displayed below presents the level of economic literacy according to children's classroom environment, namely, the class size and the experience of discussing economic issues with the teacher during the class. The level of economic literacy, table 15, was measured by the percentage of correct answers – “A_QEL” - obtained in the Questionnaire of Economic Literacy (QEL).

Table 15 – Descriptive Statistics regarding the percentage of correct answers obtained in the QEL according to classroom features

| | | Mean | Std. Deviation | Maximum | Minimum |
|---|---|--------|----------------|---------|---------|
| <u>Class economics***</u> | If the teacher talks about economic matters | ,58320 | ,170303 | ,946 | ,135 |
| | Otherwise | ,53442 | ,192526 | ,865 | ,108 |
| <u>Class size***</u> | 8 | ,83446 | ,115063 | ,946 | ,568 |
| | 11 | ,41278 | ,112148 | ,595 | ,216 |
| | 14 | ,53668 | ,167567 | ,892 | ,243 |
| | 16 | ,63176 | ,107147 | ,838 | ,459 |
| | 17 | ,65342 | ,253664 | ,919 | ,162 |
| | 21 | ,37709 | ,159087 | ,676 | ,135 |
| | 23 | ,53858 | ,135636 | ,784 | ,297 |
| | 24 | ,58164 | ,183110 | ,865 | ,135 |
| | 25 | ,53532 | ,156417 | ,865 | ,108 |
| | 26 | ,53898 | ,149708 | ,811 | ,216 |
| *** significant at 1% level; ** significant at 5% level, *significant at 10% level | | | | | |

Source: Own Elaboration

Regarding the classroom features, children whose teachers talk about economic matters during the lecture have achieved an average result of 58.32% in the QEL, whilst children whose teachers do not talk about economic issues achieved an average result of 53.44%.

Considering the class size, this variable has shown to be statistically significant at 1% level of significance, although the relationship with the level of economic literacy is not linear.

Furthermore, it is important to discriminate the results obtained in the QEL by the different areas of economic knowledge considered above. In this regard, table 16 presents the descriptive statistics related to each area thereby it is possible to identify in which areas children had a poorer performance or achieved higher results.

Table 16 – Questionnaire Contents

| | Mean | Standard Deviation | Minimum | Maximum |
|--|------|-----------------------|---------|---------|
| Economy and Consumer | 0,51 | 0,49 | 0,00 | 1,00 |
| Economy and Production | 0,64 | 0,48 | 0,00 | 1,00 |
| The Role of Government | 0,51 | 0,49 | 0,00 | 1,00 |
| The European Union | 0,86 | 0,35 | 0,00 | 1,00 |
| International Economy | 0,64 | 0,48 | 0,00 | 1,00 |
| Inflation, currency and Interest rate | 0,57 | 0,48 | 0,00 | 1,00 |
| Economy of Innovation and Entrepreneurship | 0,52 | 0,49 | 0,00 | 1,00 |

Source: Own Elaboration

In this specific case, students have shown to be more economically literate in three groups of economic concepts, more specifically, “The European Union”, “Economy and Production” and “International Economy”. Individuals have also demonstrated to be less knowledgeable in the areas entitled as “Economy and Consumer” and “The Role of Government”, with an average of 51% correct responses. However, this area has a tiny difference from the remaining questions, i.e. the descriptive statistics for this specific analysis have shown to be very homogenous.

The area “The European Union” is the one with less variability of responses around its mean, which indicates a higher level of homogeneity in terms of participants’ knowledge regarding this economic theme.

Determinants of economic knowledge

The adjusted R^2 indicates that more than 39% of the variations in the percentage of correct answers obtained in the QEL are explained by the model. Despite the adjusted R^2 is not that high, the model is globally significant, as the F-statistic probability is equal to 0.000000.

The results from estimating equation (2) and using Ordinary Least-Squares (OLS) analysis are provided in table 17 and table 18. The core variable “instruction” has shown to be statistically significant at 1% level of significance and it is positively correlated to student level of economic literacy, as expected. Children who were exposed to formal economics instruction outperformed children who did not receive economics instruction by 7 percentage points.

Thinking of children's individual characteristics, only the variables "age", "personality type", more specifically, the variable "thinking_vs_feeling" and "maths_grade" have shown to determine children's level of economic literacy.

The coefficient of the variable "age" is positive, which ascertains Walstad and Rebeck (2002)'s finding, namely, economic knowledge increases with age.

The coefficient of the variable "thinking_vs_feeling" is, simultaneously, statistically significant and positively correlated to children's achievement in economics. In other words, students who have a thinking personality type outperformed those students who have a feeling personality type in terms of percentage of correct answers obtained in the post-implementation QEL, by 3 percentage points, *ceteris paribus*.

All else equal, students' maths grade have also shown to be significant to children's scores obtained in the post-implementation QEL, as one percentage variation of "maths_grade" causes an average increase of 5 percentage points on students' performance in the QEL.

Students' attitudes towards economics are also contributing factors to a higher or lower result in economics. The interest for the discipline, represented by the dummy variable "int_economics", is positively correlated to children's scores obtained in the post-implementation questionnaire. Despite the variable "reading" has shown to be insignificant at the global model, it has proved to be statistically significant on the fourth regression at 1% level of significance. One percentage variation on the variable "reading" causes an increase of five percentage points on children's results obtained in the post-implementation test. Conversely to the literature, the importance given to economics has also shown to have a positive impact on children's economic performance, in the fourth regression exclusively. The intention to attend college has also shown to have a positive impact on children's performance, considering the fourth regression output.

Household context, namely, the father educational level, income and the debate of economic matters at home have also proved to be determinant to children's achievement of greater results in the QEL. Father educational level, represented by the ordinal variable "father_educ" has proved to be positively correlated to children's QEL scores. Therefore, children whose parents have a higher educational level tend to be more economically literate.

Children's income perception, which constitutes a proxy for family's income also affects children's tests scores positively. Children from high-income families outperform children from low-income families by 3 percentage points.

By talking about economic issues to their parents, gauged through the inclusion of a dummy variable, children gain a better understanding of the functioning of the economic world. "P_economics" has proved to be significant at 5% level of significance and it describes a positive relationship with the percentage of correct answers obtained in the QEL.

The experience of travelling was another dummy variable, included to measure household context. According to Lawson and O'Donnell (1986), it influences children's economic attainment positively. However and considering the results obtained in the current study, this variable has shown to be insignificant on the global model, but statistically significant and negatively correlated to children's economic attainment in economics, as suggested by fifth regression's results.

Finally, classroom features, including variables as "class_economics", "class_size" and b_1, c_1, b_2, c_2, d_2, a_4, b_4, c_4 and a_3, has proved to influence children's level of economic literacy. Class_economics is a dummy variable which intends to analyze if the teacher talks about economics issues during classes. This variable has proved to be insignificant.

"Class_size" has also shown to be statistically irrelevant, while the class context has proved to be significant for some of the schools. To belong to class "B" from school 1 and from school 2 reduces children's performance in economics, as it has a negative impact on the percentage of correct answers obtained in the QEL. To belong to classes "C" and "D" from school 2, as also to classes "A" and "B" from school 4 improves children's level of economic literacy. To belong to class "A" from school 3 has also a negative impact on children's stock of economic knowledge. This might be explained by factors such as teacher attributes and peer effects.

Table 17 – Econometric Results (First Regression through Fourth Regression)

| | 1st Regression | 2nd Regression | 3rd Regression | 4th Regression |
|-----------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| C | 0.547748*** (0.009622) | 0.029213 (0.107710) | -0.149304 (0.123301) | -0.216201* (0.124698) |
| instruction | 0.064319*** (0.020377) | 0.050789** (0.021696) | 0.049045** (0.021162) | 0.057449*** (0.021554) |
| Age | | 0.031322*** (0.010215) | 0.026506*** (0.009755) | 0.025453*** (0.009824) |
| Sex | | -0.007721 (0.017870) | 0.000892 (0.017503) | 0.005836 (0.017659) |
| thinking_vs_feeling | | 0.089922*** (0.032345) | 0.059796* (0.031523) | 0.055405* (0.032160) |
| judging_vs_perceiving | | 0.040262 (0.030421) | 0.005658 (0.029965) | 0.010980 (0.029892) |
| maths_grade | | 0.044507*** (0.011141) | 0.036164*** (0.010716) | 0.035317*** (0.010927) |
| int_economics | | | 0.047617* (0.025560) | 0.050529* (0.026621) |
| imp_economics | | | 0.127963*** (0.028896) | 0.110576*** (0.029988) |
| News | | | -0.011634 (0.053476) | -0.006009 (0.053151) |
| Reading | | | 0.045267*** (0.011834) | 0.045123*** (0.011990) |
| entrepreneur | | | | -0.009699 (0.018083) |
| university | | | | 0.096817*** (0.030944) |
| N | 444 | 371 | 348 | 339 |
| R ² | 0.022044 | 0.117202 | 0.215975 | 0.240046 |
| R ² – Adj | 0.019831 | 0.102651 | 0.192710 | 0.212072 |

*** significant at 1% level; ** significant at 5% level, *significant at 10% level

Source: Own Elaboration

Table 18 – Econometric Results (Fifth Regression and Sixth Regression)

| | 5th Regression | | 6th Regression | |
|-----------------------|----------------------------------|------------|----------------------------------|------------|
| C | -0.317771** | (0.137214) | -0.185308 | (0.134283) |
| Instruction | 0.040135* | (0.023247) | 0.066697*** | (0.025658) |
| Age | 0.033000*** | (0.010028) | 0.024584*** | (0.009805) |
| Sex | -0.002779 | (0.018670) | 0.005852 | (0.017212) |
| thinking_vs_feeling | 0.048572 | (0.039547) | 0.067314* | (0.036750) |
| judging_vs_perceiving | -0.008472 | (0.033283) | -0.001470 | (0.030479) |
| maths_grade | 0.046614*** | (0.012083) | 0.045846*** | (0.011490) |
| int_economics | 0.067658** | (0.029096) | 0.052000** | (0.026863) |
| imp_economics | 0.035619 | (0.034424) | 0.037136 | (0.032205) |
| News | 0.033828 | (0.056774) | -0.032543 | (0.056788) |
| Reading | 0.018132 | (0.013499) | 0.006023 | (0.012876) |
| Entrepreneur | -0.008205 | (0.019493) | -0.012541 | (0.017745) |
| University | 0.057147 | (0.036296) | 0.030270 | (0.034185) |
| father_educ | 0.032070** | (0.015924) | 0.029338** | (0.015032) |
| Income | 0.036155*** | (0.014570) | 0.030187** | (0.013521) |
| Travelling | -0.042691* | (0.025526) | -0.023300 | (0.023856) |
| bank_account | -0.019793 | (0.021620) | -0.032048 | (0.020570) |
| Psaving | 0.011540 | (0.029150) | 0.007215 | (0.026846) |
| Peconomics | 0.078291*** | (0.022806) | 0.044462** | (0.021862) |
| class_economics | | | 0.014318 | (0.019454) |
| class_size | | | 0.003361 | (0.002684) |
| b_1 | | | -0.059558* | (0.030966) |
| c_1 | | | -0.005282 | (0.036957) |
| b_2 | | | -0.058964* | (0.031218) |
| c_2 | | | 0.085968** | (0.037277) |
| d_2 | | | 0.114628*** | (0.039731) |
| a_4 | | | 0.174551*** | (0.038150) |
| b_4 | | | 0.088685*** | (0.033794) |
| c_4 | | | 0.023499 | (0.038836) |
| a_3 | | | -0.069749* | (0.037434) |
| N | 263 | | 260 | |
| R ² | 0.311405 | | 0.460879 | |
| R ² – Adj | 0.260607 | | 0.392902 | |

*** significant at 1% level; ** significant at 5% level, *significant at 10% level

4.3 Variation in economic knowledge: study 2

The efficiency of the economic program was tested through an additional econometric exercise.

For this second study only 233 students from the 444 students were selected, once the purpose is to analyse the percentage of correct answers obtained for those students who made both pre-implementation and post-implementation tests, in order to measure the flow of economic knowledge between the group of students who have been exposed to economics instruction and those who have not.

4.3.1 The variables

In this second study the dependent variable is the variation of economic knowledge between the group of students who have been exposed to economics instruction and those who have not.

The explanatory variables, factors likely to affect children's understanding of economics, are the same considered in the study 1 (see section 4.2.1)

4.3.2 The Econometric Model

Similarly to the previous study 1, a multiple regression appears to be appropriate to estimate the variation of economic knowledge from the pre-implementation test to the post-implementation test. The only and main difference between both analyses is the endogenous (or dependent) variable.

Here, instead of measuring children's level of economic literacy, the main purpose consists of determining the effect of a set of socioeconomic and demographic factors and, mainly, the effect of being exposed to formal economics instruction on the variation of knowledge. The endogenous (or dependent) variable can be represented as:

Equation 3:

$$flow_eknow = A_QEL_{posttest} - A_QEL_{pretest}$$

where A_QEL_{posttest} is the percentage of correct answers obtained in the QEL, after children complete the economic program and the A_QEL_{pretest} is the percentage of correct answers obtained in the QEL prior to the beginning of the program.

Thinking of the model, this can be described as following:

Equation 4:

$$\begin{aligned} flow_eknow_i = & \beta_0 + \beta_1 instruction_{1i} + \beta_2 age_{2i} + \beta_3 sex_{3i} + \beta_4 thinking_vs_feeling_{4i} + \\ & \beta_5 judging_vs_perceiving_{5i} + \\ & \beta_6 maths_grade_{6i} + \beta_7 int_economics_{7i} + \beta_8 imp_economics_{8i} + \beta_9 news_{9i} + \beta_{10} reading_{10i} + \\ & \beta_{11} entrepreneur_{11i} + \beta_{12} university_{12i} + \beta_{13} father_educ_{13i} + \beta_{14} mother_educ_{14i} + \beta_{15} income_{15i} \\ & + \beta_{16} travelling_{16i} + \beta_{17} bank_account_{17i} + \beta_{18} psaving_{18i} + \beta_{19} peconomics_{19i} + \\ & \beta_{20} class_economics_{20i} + \beta_{21} class_size_{21i} + \beta_{22} a_1_{22i} + \beta_{23} b_1_{23i} + \beta_{24} c_1_{24i} + \beta_{25} a_2_{25i} + \\ & \beta_{26} b_2_{26i} + \beta_{27} c_2_{27i} + \beta_{28} d_2_{28i} + \beta_{29} a_3_{29i} + \beta_{30} a_4_{30i} + \beta_{31} b_4_{31i} + \beta_{32} c_4_{32i} + \beta_{33} a_5_{33i} + u_i \end{aligned}$$

Once more and to obtain a model capable of producing unbiased estimators $\beta_0, \beta_1, \beta_2, \dots, \beta_k$ and with a minimum variance among the class of linear unbiased estimators, the same assumptions mentioned in the section 4.2.2. have to be tested and corroborated.

In this regard, the Breusch-Pagan Test for heteroscedasticity, the Jarque-Bera test for normality, the Kolmogorov-Smirnov Test, the Breusch-Godfrey test for serial or autocorrelation and the coefficient of tolerance, TOL, to evaluate the existence of multicollinearity were also applied at this stage.

According to the results obtained in Breusch-Pagan Test, both the F test and the LM (obs*R-squared) conclude for the no rejection of the null hypotheses of homoscedasticity, once the p-value is higher than 5%.

Considering the Jarque-Bera test of normality, the JB value is 29.93714 with a p-value 0.000000. Therefore, it is possible to conclude that the Jarque-Bera test have rejected the null hypotheses of normality. However, the results of the Kolmogorov-Smirnov test suggest that the residuals are normally distributed. The null hypotheses that the residuals are normally distributed is accepted, as the p-value is greater than 5%, namely, 0.200.

The results obtained through the Breusch-Godfrey test suggest that the null hypothesis of no serial correlation in residuals is corroborated, once the p-value of the Obs*R-squared is higher than 5% percent, 0.8889. This result reinforces the Durbin-Watson statistic reported on the regression output which is equal to 2.00, providing statistical evidence that there is no serial correlation in the error terms.

The tolerance factors of each of the independent variables are higher than 0.5 and close to 1.0, it becomes clear and as stated by Gul and Fong (1993) that there is low inter-correlation and thereby the multicollinearity does not constitute a problem to the estimation of the regression coefficients. It is still important to mention that “a_1”, “a_2”, “b_4”, “c_4”, “a_5” and “mother_educ” variables have been removed from the estimation. “a_5” has been removed because it is extremely correlated to class size, “a_1” and “a_2” are extremely correlated to the core variable “instruction”, “b_4” is highly correlated both to “b_1” and “c_1” and, finally, “c_4” is now a null matrix, as the sample was reduced to those students who have made both the pre-implementation test and the post-implementation test. The “mother_educ” variable is highly correlated to “father_educ”, therefore we opted for remove it from the model, for the same reason explained in the section 4.2.2.

4.3.3 Results of Study 2

Level of variation in economic knowledge

The table displayed below presents the flow of economic knowledge of those children who were not exposed to formal economics instruction in contrast with the control group who have received formal instruction. The flow of economic knowledge, presented in the table 19, is equal to the difference between the percentage of correct answers obtained in the post-implementation test and the percentage of correct answers obtained in the pre-implementation test.

Table 19 – The variation of economic knowledge

| | Instruction | Mean | N | Std. Deviation | Minimum | Maximum |
|---------|-------------|---------|-----|----------------|---------|---------|
| f_eknow | 1 | ,173312 | 84 | ,1799033 | -,4335 | ,7297 |
| | 0 | ,094316 | 149 | ,2276981 | -,3607 | ,7568 |
| | Total | ,122795 | 233 | ,2015941 | -,4335 | ,7568 |

Source: Own Elaboration

According to the statistics obtained in the table 19, 84 students from a total universe of 233 students, received formal economics instruction, which has shown to be determinant to children's flow of economic knowledge. In other words, the flow of knowledge for those children who received formal economics instruction corresponded to 17.3%, which has shown to be greater than the result obtained by children who had no formal instruction, 9.4%. It is, though, important to comprehend if the difference between the two groups was significant.

Considering the table presented in appendix 9 and as the Levene's Test for Equality of Variances is 0.011, i.e. it is less than 5%, than the null hypotheses of equal variances is rejected and only the test t presented in the row "Equal variances not assumed" is considered. The p-value of the test t is equal to 0.007, which is less than 5%, therefore it is possible to conclude that the percentage of economic knowledge acquired is significantly different among both groups, after the end of the economic program.

Children's Individual Characteristics

The table displayed below presents the flow of economic knowledge according to children's individual characteristics, namely, age, sex, personality type and mathematical skills. The flow of economic knowledge is equal to the difference between the percentage of correct answers obtained in the post-implementation test and the percentage of correct answers obtained in the pre-implementation test.

Table 20 – Descriptive Statistics regarding the variation of economic knowledge from the pre-implementation test to the post-implementation test, according to children’s individual characteristics

| | | Mean | Std. Deviation | Maximum | Minimum |
|---|----------------|-------------|-----------------------|----------------|----------------|
| <u>Age</u> | 8 | ,144751 | ,1571135 | ,2900 | -,0218 |
| | 9 | ,145240 | ,1958726 | ,7568 | -,4335 |
| | 10 | ,104842 | ,2000077 | ,7297 | -,3607 |
| | 11 | ,113306 | ,2965549 | ,4522 | -,0988 |
| | 12 | -,322245 | | -,3222 | -,3222 |
| <u>Gender</u> | Male | ,130335 | ,1932123 | ,7568 | -,3264 |
| | Female | ,116052 | ,2093627 | ,7297 | -,4335 |
| <u>Personality Type</u> | Thinking | ,128391 | ,1993387 | ,7568 | -,3264 |
| | Feeling | ,124695 | ,2161682 | ,5405 | -,3607 |
| | | | | | |
| | Judging | ,121102 | ,2017651 | ,7568 | -,3607 |
| | Perceiving | ,190796 | ,1823958 | ,5405 | -,2131 |
| <u>Maths Grade</u> | Unsatisfactory | ,172179 | ,3392761 | ,5946 | -,3607 |
| | Satisfactory | ,121367 | ,2061077 | ,6486 | -,3264 |
| | Good | ,118001 | ,1969600 | ,7297 | -,2484 |
| | Excellent | ,143420 | ,1695205 | ,7568 | -,2640 |
| *** significant at 1% level; ** significant at 5% level, *significant at 10% level | | | | | |

Source: Own Elaboration

Students’ Attitudes towards Economics

The table displayed below presents the flow of economic knowledge according to students’ attitudes towards economics, the interest for the discipline, the importance given to economics, the common practice of watching news and reading, as well the intention to go to college and to be an entrepreneur. The flow of economic knowledge is equal to the difference between the percentage of correct answers obtained in the post-implementation test and the percentage of correct answers obtained in the pre-implementation test.

Table 21 – Descriptive Statistics regarding the variation of economic knowledge from the pre-implementation test to the post-implementation test according to students’ attitudes towards economics

| | | Mean | Std. Deviation | Maximum | Minimum |
|--|--|---------|----------------|---------|---------|
| <u>Int_economics</u> | Interesting | ,138725 | ,1899958 | ,7568 | -,3264 |
| | Not interesting | ,085388 | ,2536322 | ,6486 | -,3607 |
| <u>Imp_economics**</u> | Important | ,139848 | ,1970045 | ,7568 | -,3264 |
| | Not important | ,010799 | ,1831363 | ,2900 | -,3607 |
| <u>News</u> | If the child watches news | ,128631 | ,1942037 | ,7568 | -,3607 |
| | If the child does not | ,101351 | ,2923964 | ,5946 | -,2131 |
| <u>Reading</u> | Does not read | ,113999 | ,2741073 | ,4522 | -,3264 |
| | Only academic books | -,17256 | ,2211216 | ,4304 | -,3222 |
| | Academic books, infant-juvenile literature | ,142746 | ,2018596 | ,7297 | -,3607 |
| | Journals, magazines and books. | ,134831 | ,1927704 | ,7568 | -,2640 |
| <u>Entrepreneur</u> | Intends to be! | ,143674 | ,1879999 | ,7568 | -,3264 |
| | Does not intend to be! | ,102487 | ,2143331 | ,6486 | -,3607 |
| <u>University</u> | Wants to go to university | ,132689 | ,2026852 | ,7568 | -,4335 |
| | Does not want to | ,077351 | ,2171982 | ,4522 | -,1902 |
| *** significant at 1% level; ** significant at 5% level, *significant at 10% level | | | | | |

Source: Own Elaboration

Household Context

The table displayed below presents the flow of economic knowledge according to children’s family environment, namely, the father educational level, the children’s income perception, the experience of travelling and having a bank account, as well the common practice of talking about economic matters and the importance of saving within family’s members. The flow of economic knowledge is equal to the difference between the percentage of correct answers obtained in the post-implementation test and the percentage of correct answers obtained in the pre-implementation test.

Table 22 – Descriptive Statistics regarding the variation of economic knowledge from the pre-implementation test to the post-implementation test according to children's family background

| | | Mean | Std. Deviation | Maximum | Minimum |
|---|--|----------|----------------|---------|---------|
| <u>Father educ**</u> | Low Qualification | -,009667 | ,1962661 | ,3493 | -,3222 |
| | Medium Qualification | ,114099 | ,1818832 | ,6185 | -,2287 |
| | High Qualification | ,1541174 | ,1950654 | ,7568 | -,2640 |
| <u>Income*</u> | Not enough for regular expenses | ,005457 | ,1957653 | ,4802 | -,02287 |
| | Money for basic expenses | ,132939 | ,1866403 | ,6227 | -,3607 |
| | Money= Almost Everything | ,148464 | ,2204583 | ,7568 | -,2640 |
| | Money = Everything | ,019899 | ,1295829 | ,2017 | -,1362 |
| <u>Travelling</u> | If the child knows other countries | ,120885 | ,1964501 | ,7568 | -,3607 |
| | Otherwise | ,143191 | ,2077374 | ,6486 | -,3222 |
| <u>Bank account</u> | If the child has a bank account | ,121227 | ,1716393 | ,6486 | -,2599 |
| | If the child does not have it | ,146881 | ,2611227 | ,7568 | -,3607 |
| <u>Psaving</u> | If parents talk about the importance of saving | ,127690 | ,1948226 | ,7297 | -,03264 |
| | If they do not | ,145227 | ,2499606 | ,7568 | -,3607 |
| <u>Peconomics</u> | If parents talk about economic matters | ,126783 | ,1978592 | -,7568 | -,3264 |
| | If they do not | ,136390 | ,2063580 | ,7297 | -,3607 |
| *** significant at 1% level; ** significant at 5% level, *significant at 10% level | | | | | |

Source: Own Elaboration

Classroom Context

The table displayed below presents the flow of economic knowledge according to children's classroom environment, namely, the class size and the experience of discussing economic issues with the teacher during the class. The flow of economic knowledge is equal to the difference between the percentage of correct answers obtained in the post-implementation test and the percentage of correct answers obtained in the pre-implementation test.

Table 23 – Descriptive Statistics regarding the variation of economic knowledge from the pre-implementation to the post-implementation according to classroom features

| | | Mean | Std. Deviation | Maximum | Minimum |
|--|---|---------|----------------|---------|---------|
| <u>Class economics</u>*** | If the teacher talks about economic matters | ,155075 | ,1938375 | ,7568 | -,3264 |
| | Otherwise | ,078611 | ,2004940 | ,7297 | -,3607 |
| <u>Class size</u>*** | 8 | ,48233 | ,107739 | ,623 | ,344 |
| | 11 | ,14355 | ,170954 | ,348 | -,168 |
| | 17 | ,24402 | ,113914 | ,480 | ,007 |
| | 23 | ,09190 | ,133676 | ,422 | -,260 |
| | 24 | ,11616 | ,206364 | ,757 | -,433 |
| | 25 | ,03543 | ,185291 | ,730 | -,322 |
| | 26 | ,15969 | ,196130 | ,595 | -,141 |
| *** significant at 1% level; ** significant at 5% level, *significant at 10% level | | | | | |

Source: Own Elaboration

According to the results presented above, the majority of the variables included have shown to be insignificant thereby only those capable of influencing children's flow of economic knowledge will be analysed. Considering children's attitudes towards economics, only the variable "imp_economics" has shown to be statistically significant at 5% level of significance (p-value = 0.02), see appendix 11. Moreover, students who define economics as an important discipline had a greater variation of economic knowledge from the pre-implementation test to the post-implementation test, compared to those students who do not find economics relevant. More specifically, the first group of students had a variation of economic knowledge of 13.98% against 10.80% obtained for those students who give no relevance to economics.

Students from families whose father has a high educational level have also achieved a greater variation of economic knowledge than those from families whose father has a low educational level, 15.41% against a negative variation of 0.96%. The variable "income" has proved to be statistically significant at 10% level of significance, although the relationship with the variation of economic knowledge is not linear.

To conclude, children whose teachers talked about economic issues, as well those who belong to smaller classes had a greater variation of economic knowledge, when compared to the opposite groups of students.

Determinants of variation in economic knowledge

The adjusted R^2 indicates that more than 27% of the variations in the percentage of correct answers obtained in the QEL, from the pre-implementation test through the post-implementation test, are explained by the model. Despite the adjusted R^2 is not that high, the model is globally significant, as the F-statistic probability is equal to 0.000011.

The results from estimating equation (4) and using Ordinary Least-Squares (OLS) analysis are provided in table 24 and table 25. The core variable “instruction” has shown to be statistically significant at 1% level of significance and it is positively correlated to student flow of economic knowledge, as expected. Children who were exposed to formal economics instruction had a greater variation of economic knowledge from the pre-implementation test through the post- implementation test, compared to children who did not received economics instruction.

In terms of individual characteristics, the judging personality type has shown to be statistically significant and negatively correlated to children’s variation of economic knowledge.

Similar to the first study, father educational level and income have also proved to be important to determine the progress of economic knowledge, once students from high-income families and whose father has a higher educational level had a greater difference in the acquisition of economic knowledge, from the pre-implementation test to the post-implementation test, than those from low-income families and whose father has a lower educational level.

Talking about the importance of saving to children appears to have a negative impact on their economic progress, which is difficult to explain. However and conversely, talking about economics issues with the teacher increased the difference of economic knowledge after the completion of the economic program. Class size has proved to be negatively correlated to the dependent variable thereby it is possible to conclude that smaller classes have a negative effect on student’s economics success.

To belong to class “B” from school 1, to class “A” from school 4 and to class “A” from school 3 has proved to affect student economics involvement negatively, while belonging to class “D” from school 2 contributes to increase child’s variation of economic knowledge, by 14 percentage points.

Table 24 – Econometric Results

| | 1st Regression | 2nd Regression | 3rd Regression | 4th Regression |
|-----------------------|----------------------------------|----------------------------------|----------------------------------|----------------------------------|
| C | 0.094316*** (0.016254) | 0.251118 (0.174989) | -0.047270 (0.207011) | -0.031823 (0.214939) |
| Instruction | 0.078997*** (0.027071) | 0.069970*** (0.028289) | 0.074090*** (0.028548) | 0.078920*** (0.030252) |
| Age | | 0.012225 (0.016776) | -0.004797 (0.016298) | -0.006418 (0.016528) |
| Sex | | 0.010372 (0.027670) | 0.001087 (0.028072) | -0.006235 (0.028821) |
| thinking_vs_feeling | | 0.009864 (0.052680) | 0.029930 (0.052312) | 0.033274 (0.055009) |
| judging_vs_perceiving | | -0.080648* (0.047896) | -0.142510*** (0.049823) | -0.141752*** (0.050720) |
| maths_grade | | 0.008805 (0.016829) | -0.003198 (0.017123) | -0.008199 (0.017971) |
| int_economics | | | 0.022117 (0.041132) | 0.011313 (0.044992) |
| imp_economics | | | 0.176057*** (0.057174) | 0.176429*** (0.062546) |
| News | | | 0.032309 (0.086537) | 0.028980 (0.087441) |
| Reading | | | 0.026143 (0.019651) | 0.022892 (0.020308) |
| Entrepreneur | | | | 0.036734 (0.030720) |
| University | | | | 0.016350 (0.055345) |
| N | 233 | 213 | 198 | 192 |
| R ² | 0.035553 | 0.047948 | 0.131792 | 0.133879 |
| R ² – Adj | 0.031378 | 0.020218 | 0.085364 | 0.075815 |

*** significant at 1% level; ** significant at 5% level, *significant at 10% level

Source: Own Elaboration

Table 25 – Econometric Results

| | 5th Regression | | 6th Regression | |
|-----------------------|----------------------------------|------------|----------------------------------|------------|
| C | -0.273799 | (0.239776) | -0.047639 | (0.233792) |
| Instruction | 0.091164*** | (0.033943) | 0.184162*** | (0.050678) |
| Age | 0.005091 | (0.016955) | 0.001056 | (0.016503) |
| Sex | 0.010268 | (0.031718) | -0.016349 | (0.029986) |
| thinking_vs_feeling | 0.005750 | (0.064835) | 0.028465 | (0.060489) |
| judging_vs_perceiving | -0.139460** | (0.058653) | -0.124283** | (0.055045) |
| maths_grade | -0.027173 | (0.020855) | -0.013081 | (0.020123) |
| int_economics | 0.068158 | (0.049273) | 0.068958 | (0.045978) |
| imp_economics | 0.129782* | (0.076143) | 0.090667 | (0.070404) |
| News | 0.125632 | (0.110879) | 0.068497 | (0.103541) |
| Reading | 0.006078 | (0.024330) | 0.005126 | (0.022511) |
| Entrepreneur | 0.036086 | (0.034334) | 0.004646 | (0.032414) |
| University | 0.028550 | (0.061293) | 0.007914 | (0.059417) |
| father_educ | 0.082957*** | (0.027963) | 0.071124** | (0.027881) |
| Income | 0.037284 | (0.025351) | 0.046413* | (0.024220) |
| Travelling | -0.0038457 | (0.039660) | -0.008132 | (0.037488) |
| bank_account | -0.037810 | (0.039370) | -0.020670 | (0.039757) |
| Psaving | -0.087188 | (0.054539) | -0.0083897* | (0.050386) |
| Peconomics | -0.015493 | (0.040174) | -0.015660 | (0.037812) |
| class_economics | | | 0.093693*** | (0.034971) |
| class_size | | | - 0.009833** | (0.004584) |
| b_1 | | | -0.155920*** | (0.061330) |
| c_1 | | | -0.017751 | (0.052378) |
| b_2 | | | 0.014399 | (0.054401) |
| c_2 | | | 0.028503 | (0.061416) |
| d_2 | | | 0.138925** | (0.057679) |
| a_4 | | | -0.126476* | (0.075552) |
| a_3 | | | -0.069749* | (0.037434) |
| N | 153 | | 153 | |
| R ² | 0.221985 | | 0.400515 | |
| R ² -Adj | 0.117476 | | 0.271027 | |

*** significant at 1% level; ** significant at 5% level, *significant at 10% level

Source: Own Elaboration

4.4 Final Considerations

The results obtained in the first and the second studies confirm our 1st and 2nd Hypotheses. Hence, we confirmed the efficiency of the economic program applied to the students, and, doing so, we support the idea that children have capacity and ability to understand and to learn about economic matters.

We also explored the factors that, apart from economics instruction, are likely to affect children's test scores in economics, reported in table 26.

Thinking of the first study, economics instruction is positively correlated to children's level of economic literacy.

In terms of individual characteristics, students' age, the thinking personality type and the mathematical skills have also shown to be statistically significant and positively correlated to children's QEL scores. Considering the students' attitudes towards economics, while the interest for the discipline has proved to be positively correlated to children's scores obtained in the QEL, the importance given to economics has shown to have a negative impact on children's performance.

Household context included variables, namely, father educational level, the income perception and the discussion of economic matters between parents and children have shown to be positively correlated to the percentage of correct answers obtained in the QEL. Conversely, the travelling experience impact has shown to be negative.

Finally, in terms of classroom environment, the class context, represented by each class corresponding to a specific school, might influence positively or negatively children's economic performance.

Thinking of the second study, economics instruction is positively correlated to children's variation of economic knowledge.

In terms of individual characteristics, the judging personality type has shown to be statistically significant and negatively correlated to children's variation of economic knowledge.

Similar to the first study, father educational level and income have also proved to be important to determine the progress of economic knowledge, being positively correlated to the

variation of economic knowledge from the pre-implementation test through the post-implementation test. Talking about the importance of saving to children appears to have a negative impact on their economic progress, which is difficult to explain. In other hand, talking about economics issues with the teacher and during classes increases the difference of economic knowledge after the completion of the economic program.

Class size has proved to be negatively correlated to the dependent variable thereby it is possible to conclude that smaller classes have a positive effect on student's economics success. Class context also influence children's variation of economic knowledge.

Table 26 – Synthesis of study 1 and 2

| STUDY 1/ VARIABLES | SIGNAL | SIGNIFICANCE | STUDY 2/ VARIABLES | SIGNAL | SIGNIFICANCE |
|-----------------------|--------|--------------|-----------------------|--------|--------------|
| C | - | n.s. | C | - | n.s. |
| Instruction | + | *** | Instruction | + | *** |
| Age | + | *** | Age | + | n.s. |
| Sex | + | n.s. | Sex | - | n.s. |
| Thinking_vs_feeling | + | * | Thinking_vs_feeling | + | n.s. |
| Judging_vs_perceiving | - | n.s. | Judging_vs_perceiving | - | ** |
| Maths_grade | + | *** | Maths_grade | - | n.s. |
| Int_economics | + | ** | Int_economics | + | n.s. |
| Imp_economics | + | n.s. | Imp_economics | + | n.s. |
| News | - | n.s. | News | + | n.s. |
| Reading | + | n.s. | Reading | + | n.s. |
| Entrepreneur | - | n.s. | Entrepreneur | + | n.s. |
| University | + | n.s. | University | + | n.s. |
| Father_educ | + | ** | Father_educ | + | ** |
| Income | + | ** | Income | + | * |
| Travelling | - | n.s. | Travelling | - | n.s. |
| Bank_account | - | n.s. | Bank_account | - | n.s. |
| Psaving | + | n.s. | Psaving | - | * |
| Peconomics | + | ** | Peconomics | - | n.s. |
| Class_economics | + | n.s. | Class_economics | + | *** |
| Class_size | + | n.s. | Class_size | - | ** |
| B_1 | - | * | B_1 | - | *** |
| C_1 | - | n.s. | C_1 | - | n.s. |
| B_2 | - | * | B_2 | + | n.s. |
| C_2 | + | ** | C_2 | + | n.s. |
| D_2 | + | *** | D_2 | + | ** |
| A_4 | + | *** | A_4 | - | * |
| B_4 | + | *** | A_3 | - | * |
| C_4 | + | n.s. | | | |
| A_3 | - | * | | | |

*** significant at 1% level; ** significant at 5% level, *significant at 10% level

Source: Own Elaboration

5 Conclusion

This thesis addresses two central research issues. One is related to the efficiency of economic programs applied to children, and, by doing so, it discusses also children's capacity and ability to understand and to learn about economic matters. Secondly, it aims to identify the factors that, apart from economics instruction, affect children's test scores in economics.

In chapter 2 it is conducted a literature review, considered to be the most relevant for the current work. Here, the concept of economic literacy and the importance of being economically literate, as well the evolvement of children's economic understanding and the factors that, apart from economic instruction, might influence children's tests scores in economics are clarified.

Considering the existing literature and the context of crisis in which our in which our society is inserted, to educate children is urgent, once educating children is to promote a society of financially and economically literate adults (Santomero 2003). Financially and economically literate consumers are better able to contribute to stable and prosperous communities, as well to foster economic development (Santomero 2003; Hogarth 2006).

Based on the literature review, two hypotheses were formulated. The literature provides also the *rationale* for the econometric models applied in Chapter 4. In chapter 3, the methodology used for data collection is explained in detail. The chapter 4 reports the empirical results.

The factors that, apart from economics instruction, are likely to affect children's test scores in economics are also explored. Doing a general analysis and regarding both models' results, it is possible to conclude that only the variables "instruction", "father_educ", "income" and the class context, namely "b_1", "d_2", "a_4" and "b_4", are statistically significant at both studies.

The variable "instruction" has shown to be significant at 1% level of significance, affecting both children's level of economic literacy and the variation of economic knowledge positively.

Moreover to be part of a family, whose father has a high educational level and financial resources, has shown to affect positively children's level of economic literacy and the percentage of economic knowledge gained or, in other words, the variation of economic knowledge.

Class context had a mixed impact either in terms of percentage of correct answers obtained in the post-implementation test, or in terms of the difference of correct answers obtained from the pre-implementation test to the post-implementation test.

It became also evident, while developing the current work, that the majority of studies and methods of evaluation of economic literacy were mostly oriented to the American educational system and to educational levels superior to the elementary level. One of the goals of this study is to contradict this trend and to enrich literature, by measuring the level of children's economic literacy at elementary level.

In terms of limitations, the current study was applied to a small group of students. The impact of the teacher performance could also have been considered and gauged, although we did not have access to this indicator.

Apart from that, this study contributes to an ongoing discussion in the literature, ascertaining children's interest and capacity to understand and to learn economics. Hence, economic programs targeted to this group and applied at this early age can indeed be effective. The questionnaire applied in the thesis can also be a useful tool for those that, in the future, would like to keep doing research in this specific area.

Considering future implications and further investigation issues, it would be interesting to measure, in a near future, the retention of economic knowledge on the same group of students elected for the current study. We would also like to apply the same typology of economic programs to Portugal as whole.

To conclude, and accordingly to the empirical results, economic education programs can be target at schools and at this early age, once it has shown to be efficient in the

dissemination of economic knowledge and it will strengthen the relationship between educators, consumers and children (Santomero 2003).

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APPENDIX

APPENDIX 1

| VARIABLES | VARIABLES DESCRIPTION |
|---|---|
| Dependent Variable | |
| <ul style="list-style-type: none"> A_QEL | The percentage of correct answers obtained in the QEL. |
| Independent Variables | |
| <u>Core Variable</u> | |
| <ul style="list-style-type: none"> INSTRUCTION | 1 = if the student had formal instruction in economics; 0= if the student did not have formal instruction in economics. |
| <u>Individual Characteristics</u> | |
| <ul style="list-style-type: none"> AGE SEX THINKING_VS_FEELING JUDGING_VS_PERCEIVING MATHS_GRADE | Student age. 1 = male; 0 = female. 1=thinking personality type; 0=feeling personality type. 1=judging personality type; 0=perceiving personality type. 4=excellent; 3=good; 2=satisfactory; 1=unsatisfactory. |
| <u>Student Attitudes Towards Economics</u> | |
| <ul style="list-style-type: none"> INT_ECONOMICS | 1 = if the student would like to know more about economics; 0 = if the student would not like to know more about economics. |
| <ul style="list-style-type: none"> IMP_ECONOMICS | 1 = if the student considers that knowing economics is important to his/ her future; 0 = if the student considers that knowing economics is not relevant to his/ her future. |
| <ul style="list-style-type: none"> NEWS | 1 = if the student watches television news; 0 = if the student does not watch television news. |
| <ul style="list-style-type: none"> READING | 4 = if the student reads books, magazines and journals; 3 = if the student reads academic books and infant-juvenile books; 2 = if the student only reads academic books; 1 = if the student does not like to read. |
| <ul style="list-style-type: none"> ENTREPRENEUR | 1 = if the student wants to create his/ her own company; 0 = if the student does not want to create his/ her own company. |
| <ul style="list-style-type: none"> UNIVERSITY | 1 = if the student wants to go to the university; 0 = if the student does not want to go to the university. |

| VARIABLES | VARIABLES DESCRIPTION |
|----------------------------------|--|
| <u>Household Context</u> | |
| • FATHER_EDUC | 3 = high qualification; 2 = medium qualification; 1 = low qualification. |
| • MOTHER_EDUC | 3 = high qualification; 2 = medium qualification; 1 = low qualification. |
| • INCOME | 4 = the money is enough to buy EVERYTHING the family wants to; 3 = the money is enough to buy ALMOST everything the family wants to; 2 = the money only satisfies basic needs; 1 = the money is not enough to pay regular expenses. |
| • TRAVELLING | 1 = if the student have already travel abroad; 0 = otherwise. |
| • BANK ACCOUNT | 1 = if the student has a bank account; 0 = otherwise. |
| • PECONOMICS | 1 = if parents talk about economic issues with their children; 0 = if parents do not talk about economic issues with their children. |
| • PSAVING | 1 = if parents explain the importance of saving to their children; 0 = otherwise. |
| <u>Classroom Features</u> | |
| • CIASS_SIZE | The average class size. |
| • CIASS_ECONOMICS | 1 = if the teacher discusses economic matters during classes; 0 = otherwise. |
| • A_1 | 1 = if the student belongs to class A from school 1; 0 = otherwise |
| • A_2 | 1 = if the student belongs to class A from school 2; 0 = otherwise |
| • A_3 | 1 = if the student belongs to class A from school 3; 0 = otherwise |
| • A_4 | 1 = if the student belongs to class A from school 4; 0 = otherwise |
| • A_5 | 1 = if the student belongs to school 5; 0 = otherwise. |
| • B_1 | 1 = if the student belongs to class B from school 1; 0 = otherwise. |
| • B_2 | 1 = if the student belongs to class B from school 2; 0 = otherwise |
| • B_4 | 1 = if the student belongs to class B from school 4; 0 = otherwise |
| • C_1 | 1 = if the student belongs to class C from school 1; 0 = otherwise |
| • C_2 | 1 = if the student belongs to class C from school 2; 0 = otherwise |
| • C_3 | 1 = if the student belongs to class C from school 3; 0 = otherwise |
| • D_2 | 1 = if the student belongs to class D from school 2; 0 = otherwise |

APPENDIX 2 – Testing OLS assumptions (study 1)

Breusch-Pagan-Godfrey Test for Heteroscedasticity

Heteroscedasticity is a term used to describe the situation in which the variance of the residuals (u) is not constant. Conversely, when the variance of the error terms (u) is constant, the model is homoscedastic and therefore the second condition is respected, i.e. we take as assumption that the variance of the residuals does not depend on the independent variables, symbolically

$$V(u_i) = \sigma^2 \text{ for all } i.$$

As specified in Gujarati (2003), pages 411 and 412, if an assumption is that the error variance is a linear function of a set of explanatory variables, than it is possible to express the functional form for the error variance as:

$$\sigma^2 = f(\alpha_1 + \alpha_2 x_{2i} + \alpha_3 x_{3i} + \dots + \alpha_k x_{ki})$$

If $\alpha_2 = \alpha_3 = \dots = \alpha_k = 0$; $\sigma^2 = \alpha_1$, which is a constant, than the equation errors are homoscedastic.

In this regard, the Breusch-Pagan test computes the following hypotheses:

- $H_0: \alpha_2 = \alpha_3 = \dots = \alpha_k = 0$ homoscedasticity
- $H_1: \text{not all } \alpha \text{ in } H_0 \text{ are zero}$ heteroscedasticity

This statistic test follows a chi-square (χ^2) distribution with k-1 degrees of freedom.

The output for this test is presented below:

Heteroscedasticity Test: Breusch-Pagan-Godfrey

| | | | |
|---------------------|----------|-----------------------|--------|
| F-statistic | 1.487297 | Prob. F(29,230) | 0.0586 |
| Obs*R-squared | 41.05793 | Prob. Chi-Square (29) | 0.0681 |
| Scaled explained SS | 32.46754 | Prob. Chi-Square (29) | 0.2997 |

Source: Own Elaboration

Jarque-Bera (JB) Test of Normality

Jarque-Bera test of normality is an asymptotic test or, more clearly, it is a test that is applicable in large samples only, which does not constitute a worry in this specific case, as the sample selected computes 260 observations.

According to Gurajati (2003), pages 148 and 149, the functional form of the test statistic is the following:

$$JB = n \left[\frac{S^2}{6} + \frac{(K-3)^2}{24} \right]$$

where n corresponds to the sample size and S and K are the skewness and kurtosis coefficients respectively.

Skewness and Kurtosis Coefficients might be represented as:

$$S = u_3^2 / u_2^3 \qquad K = \mu_4 + \mu_2^2$$

where μ_2 , μ_3 and μ_4 are the second, third and fourth moments about the mean respectively.

For a normal distribution, skewness “S” is equal to zero and the measure of the kurtosis “K” assumes the value 3.

Under the null hypothesis that the residuals (u) follow a normal distribution, the JB test follows a chi-square distribution with two degrees of freedom. Similar to the previous test, JB statistic test has two hypotheses:

H_0 : Normal distribution

H_1 : Not normal distribution (the residuals are not normally distributed)

To test the normality question, a histogram-normality test was run, which simultaneously performs the Jarque-Bera statistic. If the p-value of the Jarque-Bera statistics is low, i.e. if it is less than 5 percent, than the hypothesis of normal distribution of the residuals can be rejected. Conversely, if the p-value is relatively high, the residuals are normally distributed and there is no statistical inference to reject the null hypothesis. The test output is presented below.

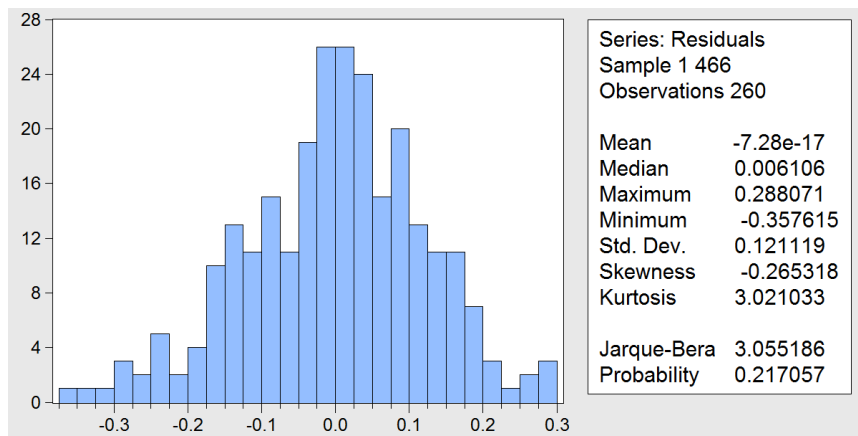


Figure 1: Jarque-Bera Test

Breusch-Godfrey Test for Serial or Autocorrelation

Serial correlation is a statistical term used to describe the situation in which members of series of observations ordered in space are correlated to each other's. The existing correlation in cross-sectional units is called spatial correlation. More clearly, serial correlation is detected when residuals are correlated with lagged values of itself (Gurajati 2003), pages 441 and 442.

To avoid some traps from the Durbin-Watson test, a more general test for serial correlation in the residuals was performed – Breusch-Godfrey test, also known as Lagrange Multiplier Test. This test computes two hypotheses:

H_0 : No serial correlation in residuals. Symbolically, $E(u_i u_j) = 0 \quad i \neq j$

H_1 : Serial correlation in residuals. Symbolically, $E(u_i u_j) \neq 0 \quad i \neq j$

If the p-value of the Obs*R-squared is higher than 5 percent, than the residuals are not serially correlated and the null hypotheses is not rejected.

The null hypothesis to be tested is

$H_0: \rho_1 = \rho_2 = \dots = \rho_k = 0$ (Gurajati 2003), page 473.

The output estimation is presented below:

Breusch-Godfrey Serial Correlation LM Test

| | | | |
|---------------|----------|----------------------|--------|
| F-statistic | 0.380214 | Prob. F(1,229) | 0.5381 |
| Obs*R-squared | 0.430968 | Prob. Chi-Square (1) | 0.5115 |

Source: Own Elaboration

This result reinforces the Durbin-Watson statistic automatically produced by the E-views, while estimating the regression output. This statistic test is

$$d = 2(1 - \rho)$$

The Durbin-Watson statistic reported on the regression output is equal to 1.71, which is a d-statistic close to 2, providing statistical evidence that there is no serial correlation in the error terms.

Multicollinearity

As stated by Gujarati (2003), page 342, Ragnar Frisch is the responsible for the term multicollinearity. When there is evidence of a perfect or exact linear relationship among some or all explanatory variables, this is called multicollinearity. The assumption of perfect multicollinearity is satisfied when:

$$\lambda_1 x_1 + \lambda_2 x_2 + \dots + \lambda_k x_k = 0$$

where $\lambda_1, \lambda_2, \dots, \lambda_k$ are constants, not all of them zero simultaneously.

Using a more concrete example, in the regression:

$y = \beta_1 x_1 + \beta_2 x_2 + \beta_3 x_3 + u$, if $x_3 = 2x_1 + 3x_2$ then $(\beta_1 + 2\beta_3)$ and $(\beta_2 + 3\beta_3)$ are the linear functions estimable, but $\beta_1, \beta_2, \beta_3$ are not separately estimable.

When the explanatory variables are not exactly correlated, i.e. when the multicollinearity is not perfect, then it can be stated as:

$$\lambda_1 x_1 + \lambda_2 x_2 + \dots + \lambda_k x_k + v_i = 0$$

where v_i is a stochastic error term.

If the multicollinearity is perfect, the regression coefficients of the explanatory variables are indeterminate and their standard errors are infinite, thereby not all parameters are estimable. Otherwise, if the multicollinearity is less than perfect, then the regression

coefficients, despite estimable, will hold large standard errors in comparison to the regression coefficients themselves, which means thereby the coefficients will be estimated with neither precision nor accuracy (Gurajati 2003), page 344.

Nonetheless, if there are inter-correlations among X's variables, it is though important to gauge the effect of multicollinearity on the model. One coefficient to evaluate the existence of multicollinearity is called tolerance (TOL), which is the inverse of the VIF (Variance Inflation Factors). Symbolically:

$$TOL_j = \frac{1}{VIF_j} = (1 - R_j^2)$$

Here, the R_j^2 results from a regression where an independent variable is the dependent variable and the remaining variables are the independent variables, following the same methodology for each one of the exogenous variables. When $R_j^2 = 1$ means perfect collinearity or multicollinearity and TOL_j is equal to 0. When $R_j^2 = 0$, it means there is no collinearity and $TOL_j = 1$ (Gurajati 2003), page 353.

Testing Multicollinearity Effect

| Variables | Tolerance Factor | Coefficient of Partial Determination |
|-----------------------|------------------|--------------------------------------|
| Instruction | 0,56 | 0,44 |
| Age | 0,73 | 0,27 |
| Sex | 0,87 | 0,13 |
| thinking_vs_feeling | 0,81 | 0,19 |
| judging_vs_perceiving | 0,88 | 0,12 |
| maths_grade | 0,74 | 0,26 |
| int_economics | 0,77 | 0,23 |
| imp_economics | 0,76 | 0,24 |
| News | 0,87 | 0,13 |
| Reading | 0,86 | 0,14 |
| Entrepreneur | 0,87 | 0,13 |
| University | 0,84 | 0,16 |
| father_educ | 0,81 | 0,19 |
| Income | 0,87 | 0,13 |
| Travelling | 0,86 | 0,14 |
| bank_account | 0,80 | 0,20 |
| Psaving | 0,80 | 0,20 |
| Peconomics | 0,62 | 0,38 |
| class_economics | 0,78 | 0,22 |
| class_size | 0,51 | 0,49 |
| b_1 | 0,57 | 0,43 |
| c_1 | 0,72 | 0,28 |
| b_2 | 0,64 | 0,36 |
| c_2 | 0,59 | 0,41 |
| d_2 | 0,70 | 0,30 |
| a_4 | 0,64 | 0,36 |
| b_4 | 0,64 | 0,36 |
| c_4 | 0,73 | 0,27 |
| a_3 | 0,67 | 0,33 |

Source: Own Elaboration

APPENDIX 3 –Independent Samples Test (Study 1)

| | | Levene's Test for Equality of Means | | t-test for Equality of Means | | |
|-------|-----------------------------|-------------------------------------|------|------------------------------|---------|-----------------|
| | | F | Sig. | T | Df | Sig. (2-tailed) |
| A_QEL | Equal variances assumed | 13,480 | ,000 | 3,156 | 442 | ,002 |
| | Equal variances not assumed | | | 2,734 | 132,985 | ,007 |

APPENDIX 4 – ANOVA Analysis of Children's Individual Characteristics (Study 1)

| | | F | Sig. |
|-------------------------------|---------------------------|--------|------|
| A_QEL *age | Between Groups (Combined) | 11,140 | ,000 |
| A_QEL*sex | Between Groups (Combined) | 1,30 | ,719 |
| A_QEL* thinking_vs_feeling | Between Groups (Combined) | 17,658 | ,000 |
| A_QEL*judging_vs_perceiving | Between Groups (Combined) | 7,453 | ,007 |
| A_QEL* maths_grade | Between Groups (Combined) | 4,708 | ,003 |

Source: Own Elaboration

APPENDIX 5 – ANOVA Analysis of Children’s Attitudes towards Economics (Study 1)

| | | F | Sig. |
|--------------------------------|------------------------------|----------|-------------|
| A_QEL *int_economics | Between Groups (Combined) | 12,106 | ,001 |
| A_QEL*imp_economics | Between Groups (Combined) | 39,238 | ,000 |
| A_QEL*news | Between Groups (Combined) | ,528 | ,468 |
| A_QEL*reading | Between Groups (Combined) | 11,115 | ,000 |
| A_QEL* Entrepreneur | Between Groups (Combined) | ,915 | ,339 |
| A_QEL* university | Between Groups (Combined) | 20,570 | ,000 |

Source: Own Elaboration

APPENDIX 6 – ANOVA Analysis of Children’s Family Background (Study 1)

| | | F | Sig. |
|--------------------------------|------------------------------|----------|-------------|
| A_QEL *father_educ | Between Groups (Combined) | 4,774 | ,009 |
| A_QEL*income | Between Groups (Combined) | 8,282 | ,000 |
| A_QEL* Travelling | Between Groups (Combined) | 2,957 | ,086 |
| A_QEL*bank_ Account | Between Groups (Combined) | 14,959 | ,000 |
| A_QEL* Psaving | Between Groups (Combined) | 14,442 | ,000 |
| A_QEL* Peconomics | Between Groups (Combined) | 57,264 | ,000 |

Source: Own Elaboration

APPENDIX 7 – ANOVA Analysis of classroom features (Study 1)

| | | F | Sig. |
|---------------------------|------------------------------|-------|------|
| A_QEL *class_economics | Between Groups (Combined) | 6,748 | ,010 |
| A_QEL* class_size | Between Groups (Combined) | 7,990 | ,000 |

Source: Own Elaboration

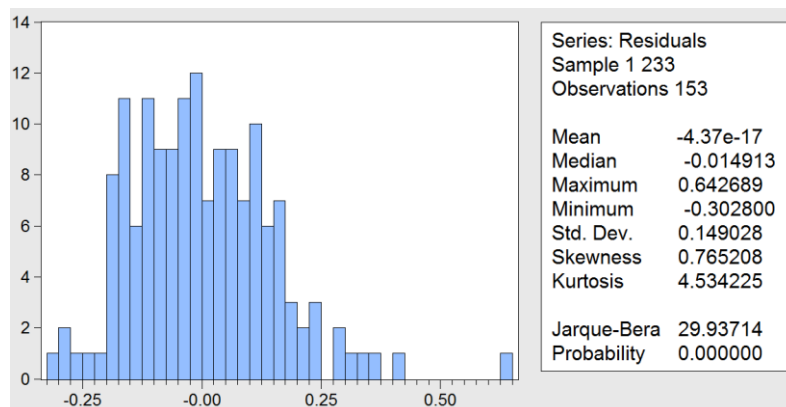
APPENDIX 8

Breusch-Pagan-Godfrey Test for Heteroscedasticity

| | | | |
|---------------------|----------|-----------------------|--------|
| F-statistic | 1.089592 | Prob. F(28,124) | 0.3617 |
| Obs*R-squared | 30.21069 | Prob. Chi-Square (28) | 0.3532 |
| Scaled explained SS | 35.06593 | Prob. Chi-Square (28) | 0.1680 |

Source: Own Elaboration

Jarque-Bera (JB) Test of Normality



Kolmogorov-Smirnov Test

| | Statistic | Df | Sig. |
|-----------------------|-----------|-----|------|
| Standardized Residual | ,064 | 153 | ,200 |

Source: Own Elaboration

Kolmogorov-Smirnov is a non-parametric test, which quantifies the difference between the empirical distribution function and the cumulative distribution function of the sample. The null hypotheses, in this case, that the residuals are normally distributed is accepted, as the p-value is greater than 5%, namely, 0.200.

Sample size might be the factor influencing the outcome of the statistical tests. Jarque-Bera is a specific test for large samples and once the sample was reduced to half, than the test might be inadequate and not sufficient robust to estimate the sample normality. Nevertheless and considering that Kolmogorov-Smirnov test does not reject the assumption of normality, then the premise of normal distribution in residuals is corroborated.

Breusch-Godfrey Test for Serial or Autocorrelation

| | | | |
|---------------|----------|----------------------|--------|
| F-statistic | 0.015701 | Prob. F(1,229) | 0.9005 |
| Obs*R-squared | 0.019528 | Prob. Chi-Square (1) | 0.8889 |

Source: Own Elaboration

Once the p-value of the Obs*R-squared is higher than 5% percent, 0.8889, it is possible to infer that the disturbance term relating to any observation is not affected by the disturbance term relating to any other observation. In other words, the null hypothesis of no serial correlation in residuals is corroborated. This result reinforces the Durbin-Watson statistic automatically produced by the E-views, while estimating the regression output.

The Durbin-Watson statistic reported on the regression output is equal to 2.00, providing statistical evidence that there is no serial correlation in the error terms.

Testing the Multicollinearity Effect

| Variables | Tolerance Factor | Coefficient of Partial Determination |
|-----------------------|------------------|--------------------------------------|
| Instruction | 0,55 | 0,45 |
| Age | 0,79 | 0,21 |
| Sex | 0,79 | 0,21 |
| thinking_vs_feeling | 0,73 | 0,27 |
| judging_vs_perceiving | 0,75 | 0,25 |
| maths_grade | 0,67 | 0,33 |
| int_economics | 0,77 | 0,23 |
| imp_economics | 0,72 | 0,28 |
| News | 0,86 | 0,14 |
| Reading | 0,79 | 0,21 |
| Entrepreneur | 0,79 | 0,21 |
| University | 0,69 | 0,31 |
| father_educ | 0,66 | 0,34 |
| Income | 0,76 | 0,24 |
| Travelling | 0,78 | 0,22 |
| bank_account | 0,65 | 0,35 |
| Psaving | 0,79 | 0,21 |
| Economics | 0,68 | 0,32 |
| class_economics | 0,67 | 0,33 |
| class_size | 0,51 | 0,49 |
| b_1 | 0,50 | 0,50 |
| c_1 | 0,62 | 0,38 |
| b_2 | 0,68 | 0,32 |
| c_2 | 0,65 | 0,35 |
| d_2 | 0,60 | 0,40 |
| a_4 | 0,56 | 0,44 |
| a_3 | 0,59 | 0,41 |

Source: Own Elaboration

| | | Levene's Test for Equality of Means | | t-test for Equality of Means | | |
|---------|-----------------------------|-------------------------------------|------|------------------------------|---------|-----------------|
| | | F | Sig. | T | Df | Sig. (2-tailed) |
| F_eknow | Equal variances assumed | 6,591 | ,011 | 2,918 | 231 | ,004 |
| | Equal variances not assumed | | | 2,735 | 141,847 | ,007 |

APPENDIX 9 – Independent Samples Test (Study 2)

Source: Own Elaboration

APPENDIX 10 – ANOVA Analysis of Children’s Individual Characteristics (Study 2)

| | | F | Sig. |
|---|------------------------------|----------|-------------|
| F_eknow *age | Between Groups (Combined) | 1,811 | ,128 |
| F_eknow*sex | Between Groups (Combined) | ,291 | ,590 |
| F_eknow* thinking_vs_feeling | Between Groups (Combined) | ,007 | ,934 |
| F_eknow*judging_vs_perceiving | Between Groups (Combined) | 2,407 | ,122 |
| F_eknow* maths_grade | Between Groups (Combined) | ,401 | ,752 |

Source: Own Elaboration

APPENDIX 11 – ANOVA Analysis of Children’s Attitudes towards Economics (Study 2)

| | | F | Sig. |
|-----------------------------------|---------------------------------|----------|-------------|
| F_eknow *int_economics | Between Groups (Combined) | 1,756 | ,187 |
| F_eknow *imp_economics | Between Groups (Combined) | 9,781 | ,02 |
| F_eknow*news | Between Groups (Combined) | ,146 | ,703 |
| F_eknow *reading | Between Groups (Combined) | 1,954 | ,122 |
| F_eknow * Entrepreneur | Between Groups (Combined) | 2,194 | ,140 |
| F_eknow* university | Between Groups (Combined) | 1,156 | ,284 |

Source: Own Elaboration

APPENDIX 12 – ANOVA Analysis of Children’s Family Background (Study 2)

| | | F | Sig. |
|-----------------------------|------------------------------|----------|-------------|
| F_eknow*father_educ | Between Groups (Combined) | 3,752 | ,025 |
| F_eknow*income | Between Groups (Combined) | 2,520 | ,059 |
| F_eknow*Travelling | Between Groups (Combined) | ,469 | ,494 |
| F_eknow*bank_Account | Between Groups (Combined) | ,731 | ,393 |
| F_eknow*Psaving | Between Groups (Combined) | ,162 | ,687 |
| F_eknow*Peconomics | Between Groups (Combined) | ,93 | ,760 |

Source: Own Elaboration

APPENDIX 13 – ANOVA Analysis of Classroom Features (Study 2)

| | | F | Sig. |
|--------------------------------|------------------------------|----------|-------------|
| F_eknow*class_economics | Between Groups (Combined) | 7,698 | ,006 |
| F_eknow*class_size | Between Groups (Combined) | 7,522 | ,000 |






Source: Own Elaboration

APPENDIX 14 – Questionnaire of Economic Literacy

NOME: _____ IDADE: _____

O QUE SABES SOBRE ECONOMIA?

FAZ UM CÍRCULO EM VOLTA DA OPÇÃO QUE ACHAS QUE ESTÁ CORRECTA!

1. Os materiais que vêm da natureza, como a água, o petróleo e a madeira são exemplos de:
a. Serviços
b. Bens produzidos
c. Recursos naturais
d. Não sei

2. Quais dos seguintes correspondem a formas ou meios de pagamento:
a. Notas e moedas
b. Cartão multibanco
c. Ambas as anteriores
d. Não sei
3. Uma pessoa que faz um bem ou providencia um serviço é chamada de:
a. Consumidor
b. Produtor
c. Comprador
d. Não sei
4. Os bons desportistas, como os bons jogadores de futebol, recebem mais dinheiro do que um carteiro porque:
a. São mais escassos / raros
b. Têm um trabalho mais desagradável
c. São mais giros
d. Não sei

5. Os recursos usados na produção de bens e serviços são limitados. Em resultado devemos:
a. Fazer escolhas sobre como usar os recursos de forma eficiente
b. Produzir mais até acabar com os recursos existentes
c. Não produzir e comprar só produtos estrangeiros
d. Não sei
6. Portugal vende computadores Magalhães para a Venezuela. Portugal é:
a. Exportador
b. Importador
c. Consumidor
d. Não sei

7. O dinheiro que as pessoas colocam de lado para usar no futuro ou para situações inesperadas é chamado de:
a. Poupança
b. Lucro
c. Investimento
d. Não sei
8. Pelo dinheiro que guardas no banco, o banco paga-te um:
a. Um salário
b. Um lucro
c. Um juro
d. Não sei


9. Na Europa, o Banco Central Europeu:
- a. Gere a quantidade de moeda e as taxas de juro
 - b. Faz o sorteio do Euromilhões
 - c. Produz bancos de jardim
 - d. Não sei
10. Quando pedimos dinheiro ao banco para comprarmos algo (ex. uma casa) diz-se que:
- a. Pedimos um empréstimo e temos de o pagar de volta com juros
 - b. Fizemos um investimento e o banco paga-nos um juro
 - c. Pedimos um empréstimo e não temos de o pagar de volta
 - d. Não sei
11. Quando um governo tem mais despesas (gastos) que receitas (recebimentos), gera-se um:
- a. Défice orçamental
 - b. Saldo orçamental
 - c. Balanço
 - d. Não sei
12. A inovação é importante porque:
- a. Permite que as empresas tenham mais lucro ou reduzam custos e preços, beneficiando todos
 - b. O que é novo é sempre melhor
 - c. É fundamental para os consumidores estarem contentes
 - d. Não sei
13. Do ponto de vista económico, para decidir qual de dois bens comprar, deves sempre:
- a. Escolher o bem que custa menos
 - b. Escolher o bem com maiores benefícios
 - c. Escolher tendo em conta os custos e benefícios de ambos os bens
 - d. Não sei
14. Existem bens e serviços que os governos oferecem. Quem beneficia com eles?
- a. Mais do que uma pessoa de cada vez, quer tenha pago por eles ou não
 - b. Apenas a pessoa que pagou por eles
 - c. Os comerciantes à custa dos consumidores
 - d. Não sei
15. Se a Itália deixar de importar carros da Alemanha, quem beneficiará:
- a. Produtores de carros da Alemanha
 - b. Consumidores na Itália
 - c. Produtores de carros da Itália
 - d. Não sei
16. Um aumento significativo do número de restaurantes numa determinada localidade, terá como efeito:
- a. Menores preços e maior qualidade
 - b. Não tem nenhum efeito
 - c. Menores preços e menos qualidade
 - d. Não sei



17. Uma pessoa que assume riscos e inicia um negócio para produzir novos bens ou serviços é conhecida por:

- a. Gestor
- b. Político
- c. Empreendedor
- d. Não sei

18. Um grande aumento nos custos de produção de calças de ganga, resultará em:

- a. Menores preços das calças e menos calças compradas
- b. Maiores preços das calças e menos calças compradas
- c. Não terá efeito na quantidade comprada de calças
- d. Não sei

19. Qual dos seguintes fatores limita o nível de produção que um país consegue obter?

- a. A quantidade e qualidade de trabalho, capital e recursos naturais
- b. O poder do governo
- c. O número de pontes e estradas
- d. Não sei



20. Para um país competir internacionalmente, é importante:

- a. Manter os salários baixos e trabalhadores sem estudos
- b. Importar tudo de outros países
- c. Promover a formação dos trabalhadores e sua produtividade
- d. Não sei

21. Se um fabricante de tênis não conseguir produzir tantos tênis como os que as pessoas querem comprar, o preço dos tênis irá:





- a. Aumentar
- b. Diminuir
- c. Permanecer igual
- d. Não sei

22. Qual a remuneração de cada um dos seguintes recursos (faz corresponder o recurso da coluna da esquerda à sua remuneração na coluna da direita):

| Recurso | Remuneração |
|------------------------------|----------------|
| Trabalho • | • Lucro / Juro |
| Capital / Investimentos • | • Rendas |
| Propriedades e/ou terrenos • | • Salário |

23. Quando os Governos gastam mais do que recebem durante vários anos gera-se uma elevada dívida. Quem irá pagar essa dívida?

- a. As gerações futuras, isto é, os adultos do futuro
- b. Ninguém
- c. Os políticos/governos que governaram mal o país
- d. Não sei

24. Todos os cidadãos devem pagar impostos para que o governo possa:
- | | |
|--|--|
| a. Aumentar salários aos trabalhadores do Estado | c. Oferecer alguns serviços essenciais à população (educação, saúde) |
| b. Criar empresas grandes | d. Não sei |
25. Os preços devem manter-se estáveis, pois se os preços aumentarem, o dinheiro que cada um de nós possui passa a valer:
- | | |
|----------|------------|
| a. Mais | c. O mesmo |
| b. Menos | d. Não sei |
26. Sabes como se chama o grupo económico onde Portugal se encontra inserido na Europa?
- | | |
|---------------------|-------------------|
| a. Liga Europa | c. União Europeia |
| b. Países Asiáticos | d. Não sei |
- 
27. A quantidade total de um bem que os consumidores estão dispostos a comprar designa-se por:
- | | |
|-------------------|-----------------------------------|
| a. Procura do bem | c. Ponto de equilíbrio de mercado |
| b. Oferta do bem | d. Não sei |
28. Melhorar a produtividade significa:
- | | |
|--|---|
| a. Produzir menos com os mesmos recursos | c. Produzir a mesma quantidade com os mesmos recursos |
| b. Produzir mais com os mesmos recursos | d. Não sei |
29. O uso de tecnologia mais avançada permite às empresas:
- | | |
|---|-------------------------------------|
| a. Diminuir a sua competitividade | c. Produzir menos com mais recursos |
| b. Aumentar a produtividade e reduzir os custos do trabalho e os preços | d. Não sei |
30. Quando os preços sobem de forma contínua e generalizada diz-se que existe:
- | | |
|---------------------------------|-------------|
| a. Défice nas contas do governo | c. Inflação |
| b. Desemprego | d. Não sei |
- 
31. O custo de oportunidade de uma escolha corresponde:
- | | |
|---|--|
| a. Ao benefício de usufruirmos daquilo que escolhemos | c. À soma das diferentes opções que não foram escolhidas |
| b. À segunda melhor alternativa que não foi escolhida | d. Não sei |

32. Quando vais ao banco trocar euros por dólares americanos diz-se que estás a efetuar uma operação de:

- a. Câmbio
- b. Pagamento
- c. Negociação
- d. Não sei



33. Às variações da atividade económica de um país chamamos de:

- a. Inflação
- b. PIB
- c. Ciclos económicos
- d. Não sei

34. O dinheiro, as máquinas e as ferramentas que uma empresa possui, fazem parte do seu capital:

- a. Humano
- b. Físico
- c. Financeiro
- d. Não sei



35. Empresas mais produtivas e eficientes são importantes para o país porque:

- a. Permitem aumentar a produção e exportar mais
- b. Permitem criar mais riqueza e crescimento
- c. Ambas as anteriores
- d. Não sei

36. A diminuição do nível global de produção de um país (PIB) designa-se por:

- a. Recessão
- b. Crescimento
- c. Globalização
- d. Não sei



37. Qual dos seguintes corresponde a uma agente económico:

- a. Famílias
- b. Empresas
- c. Ambas as anteriores
- d. Não sei

38. Tens uma ideia de como a crise atual está a afetar a tua família?

- a. Sim. Indica como: _____

b. Acho que não afeta a minha família

c. Não sei

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COMO É O TEU DIA A DIA



1. Qual foi a tua nota a matemática no 2º Período?
a. Satisfaz Muito c. Satisfaz Bem
b. Satisfaz Bem d. Não Satisfaz
2. Nas tuas aulas costumam falar sobre assuntos de economia?
a. Sim b. Não c. Não sei
3. Um dia, se fores para a Universidade, o que gostarias de estudar?
a. Gostava de estudar: _____
b. Não quero ir para a Universidade
4. Gostavas de vir a criar e ser dono de uma empresa?
a. Sim b. Não c. Não sei
5. Os teus pais costumam falar contigo sobre a importância da poupança?
a. Sim b. Não
6. Tens uma conta no banco onde guardas as tuas poupanças?
a. Sim b. Não c. Não sei
7. Os teus pais costumam falar contigo sobre assuntos de economia?
a. Sim b. Não
8. Achas que é importante saber sobre economia para teres mais sucesso no futuro?
a. Sim b. Não c. Não sei
9. Gostavas de saber mais sobre economia?
a. Sim b. Não c. Não sei
10. Como são os teus hábitos de leitura?
a. Não gosto de ler
b. Leio apenas os livros escolares
c. Leio os livros escolares e outros livros infantis/juvenis
d. Gosto de ler e leio diferentes coisas (livros, revistas, jornais, etc)
11. Que atividades extracurriculares praticas?
a. Música e. Ciência i. Outra. Qual: _____
b. Ginástica f. Inglês
c. Dança g. Pintura j. Não pratico
d. Xadrez h. Natação
12. Em tua casa, costumavas ver e estar atento aos noticiários?
a. Sim, frequentemente. b. Sim, às vezes. c. Não.



13. Quando os teus pais estão de férias, costumam ir para algum outro sítio?

- a. Sim, viajamos para outras cidades ou países b. Não, costumamos ficar em casa

14. Já viajaste com a tua família para outro país?

- a. Sim, várias vezes b. Sim, poucas vezes c. Não

15. Quantas pessoas vivem em tua casa? _____ pessoas

16. Quantos quartos tem a tua casa? _____ quartos



17. Costumas ir ao cinema?

- a. Sim, várias vezes por ano b. Sim, mas muito raramente c. Não

18. Costumas ir comer fora?

- a. Sim, várias vezes por mês b. Sim, mas muito raramente c. Não

19. Já andaste de avião?

- a. Sim, muitas vezes. b. Sim, poucas vezes. c. Não



20. O que sentes relativamente ao dinheiro que os teus pais ganham?

- a. Sinto que dá para comprar TUDO o que desejamos
b. Sinto que dá para comprar QUASE tudo o que desejamos
c. Sinto que dá APENAS para as necessidades básicas (comida, casa, roupa)
d. Sinto que os meus pais têm DIFICULDADES em pagar as despesas normais que têm

21. Imagina que tens de escolher entre ir ao cinema com a Maria e estudar para o teste que tens no dia a seguir. O que fazes?

- a. Primeiro penso nas vantagens e desvantagens de ir ao cinema
b. Decido logo ir ao cinema porque a Maria é minha amiga e não quero que ela fique triste comigo

22. Quanto tens um teste, como costumavas fazer?

- a. Gosto de ler todos os meus apontamentos bem organizados e planeio o meu estudo de acordo com o tempo que tenho
b. Não costumo organizar o meu estudo e geralmente consigo fazer os meus trabalhos à última da hora e por isso também consigo sair-me bem no teste.

23. O teu pai:

- a. Estudou até ao 4º Ano d. Estudou na Universidade
b. Estudou até ao 9º Ano e. Não sei
c. Estudou até ao 12º Ano



24. A tua mãe:

- a. Estudou até ao 4º Ano
b. Estudou até ao 9º Ano
c. Estudou até ao 12º Ano
d. Estudou na Universidade
e. Não sei

25. O teu pai:

- a. Trabalha b. Está desempregado c. É Doméstico d. Estuda

26. A tua mãe:

- a. Trabalha b. Está desempregada c. É Doméstica d. Estuda

27. Qual é a profissão do teu pai (ou qual foi a última profissão, no caso de estar desempregado)? Pede ajuda ao teu professor.

- | | | |
|--|---|---|
| <input type="checkbox"/> Advogado | <input type="checkbox"/> Empregado de instituição bancária | <input type="checkbox"/> Operador de Máquinas |
| <input type="checkbox"/> Arquiteto | <input type="checkbox"/> Empresário | <input type="checkbox"/> Operário (trabalha numa fábrica) |
| <input type="checkbox"/> Bombeiro | <input type="checkbox"/> Enfermeiro | <input type="checkbox"/> Padeiro/ Pasteleiro |
| <input type="checkbox"/> Camionista | <input type="checkbox"/> Engenheiro | <input type="checkbox"/> Pintor |
| <input type="checkbox"/> Carteiro | <input type="checkbox"/> Especialista de Informática (analista, engenheiro) | <input type="checkbox"/> Polícia / Agente |
| <input type="checkbox"/> Chefe de Máquinas | <input type="checkbox"/> Feirante | <input type="checkbox"/> Professor primário |
| <input type="checkbox"/> Chefe de Secção | <input type="checkbox"/> Funcionário num serviço público (finanças, inst. emprego, seg. social, etc.) | <input type="checkbox"/> Professor do ciclo, secundário ou universidade |
| <input type="checkbox"/> Comerciante | <input type="checkbox"/> Gerente bancário / agente de Seguros | <input type="checkbox"/> Psicólogo |
| <input type="checkbox"/> Contabilista | <input type="checkbox"/> Jornalista | <input type="checkbox"/> Segurança |
| <input type="checkbox"/> Cozinheiro | <input type="checkbox"/> Jurista | <input type="checkbox"/> Serralheiro / Soldador |
| <input type="checkbox"/> Dentista | <input type="checkbox"/> Mecânico | <input type="checkbox"/> Técnico de Informática (arranja computadores, programador) |
| <input type="checkbox"/> Diretor/ Gestor de Empresas | <input type="checkbox"/> Médico | <input type="checkbox"/> Técnico de Máquinas |
| <input type="checkbox"/> Diretor de um serviço público | <input type="checkbox"/> Militar | <input type="checkbox"/> Trabalha na Construção Civil |
| <input type="checkbox"/> Diretor de obras | <input type="checkbox"/> Motorista | <input type="checkbox"/> Vendedor |
| <input type="checkbox"/> Distribuidor | <input type="checkbox"/> Maestro / Músico | <input type="checkbox"/> Outra: _____ |
| <input type="checkbox"/> Economista | | |
| <input type="checkbox"/> Eletricista | | |
| <input type="checkbox"/> Empregado de Balcão / Mesa | | |
| <input type="checkbox"/> Empregado de Comércio / Loja | | |
| <input type="checkbox"/> Empregado de Escritório | | |

28. Qual é a profissão da tua mãe (ou qual foi a última profissão, no caso de estar desempregada)? Pede ajuda ao teu professor.

- | | | |
|--|---|--|
| <input type="checkbox"/> Advogada | <input type="checkbox"/> Empregada de Escritório | <input type="checkbox"/> Gerente bancária/ agente de Seguros |
| <input type="checkbox"/> Ama | <input type="checkbox"/> Empregada de instituição bancária | <input type="checkbox"/> Jornalista |
| <input type="checkbox"/> Arquiteta | <input type="checkbox"/> Empregada de Limpezas | <input type="checkbox"/> Jurista/ Juíza |
| <input type="checkbox"/> Assistente Operacional | <input type="checkbox"/> Empresária | <input type="checkbox"/> Médica |
| <input type="checkbox"/> Assistente Social | <input type="checkbox"/> Enfermeira | <input type="checkbox"/> Operária (trabalha numa fábrica) |
| <input type="checkbox"/> Auxiliar (escola, hospital, etc.) | <input type="checkbox"/> Engenheira | <input type="checkbox"/> Pasteleira |
| <input type="checkbox"/> Bibliotecária | <input type="checkbox"/> Escriturária | <input type="checkbox"/> Peixeira |
| <input type="checkbox"/> Cabeleireira | <input type="checkbox"/> Especialista de Informática (analista, engenheira) | <input type="checkbox"/> Polícia |
| <input type="checkbox"/> Comerciante | <input type="checkbox"/> Esteticista/ Maquilhadora | <input type="checkbox"/> Professora primária |
| <input type="checkbox"/> Contabilista/ Técnica de Contas | <input type="checkbox"/> Farmacêutica | <input type="checkbox"/> Professora do ciclo, secundário ou universidade |
| <input type="checkbox"/> Cozinheira | <input type="checkbox"/> Feirante | <input type="checkbox"/> Psicóloga |
| <input type="checkbox"/> Decoradora | <input type="checkbox"/> Formadora/ Explicadora | <input type="checkbox"/> Rececionista |
| <input type="checkbox"/> Dentista | <input type="checkbox"/> Gerente bancária / agente de Seguros | <input type="checkbox"/> Secretária |
| <input type="checkbox"/> Diretora de um serviço público | <input type="checkbox"/> Funcionária num serviço público (finanças, inst. emprego, seg. social, etc.) | <input type="checkbox"/> Vendedora |
| <input type="checkbox"/> Diretora/ Gerente de Empresas | <input type="checkbox"/> Gestora de Produto | <input type="checkbox"/> Vigilante |
| <input type="checkbox"/> Economista | | <input type="checkbox"/> Outra: _____ |
| <input type="checkbox"/> Educadora de Infância | | |
| <input type="checkbox"/> Empregada de Balcão/ Mesa | | |
| <input type="checkbox"/> Empregada de Comércio / Loja | | |

Obrigada ☺